

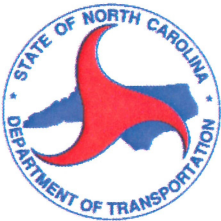
PROPOSED SR 1409 (MILITARY CUTOFF ROAD) EXTENSION AND  
PROPOSED US 17 HAMPSTEAD BYPASS  
NEW HANOVER AND PENDER COUNTIES  
STATE PROJECT 40191.1.2  
NCDOT STIP PROJECTS U-4751 AND R-3300  
CORPS ACTION ID 2007 1386

ADMINISTRATIVE ACTION  
FINAL ENVIRONMENTAL IMPACT STATEMENT  
July 2014



**US Army Corps  
of Engineers**  
Wilmington District

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North Carolina Department of Transportation





PROPOSED SR 1409 (MILITARY CUTOFF ROAD) EXTENSION  
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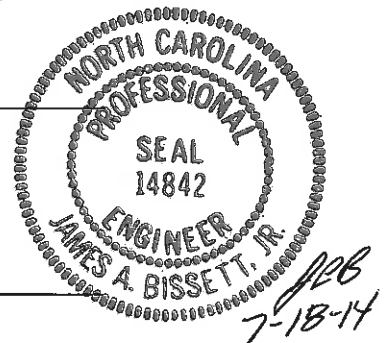
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Documentation Prepared by  
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# **PROJECT COMMITMENTS**

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## **PROPOSED MILITARY CUTOFF ROAD EXTENSION AND PROPOSED US 17 HAMPSTEAD BYPASS**

New Hanover and Pender Counties

State Project 40191.1.2

**STIP Projects U-4751 and R-3300**

### **PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS UNIT**

- Additional coordination with the US Fish and Wildlife Service regarding the project's potential effects on endangered species will be conducted prior to submitting the Section 404 permit application to the US Army Corps of Engineers.
- If red-cockaded woodpecker foraging habitat ceases to exist at the northern interchange at the time NCDOT applies for authorization from the US Army Corps of Engineers to construct the project, the Department will revisit the original interchange design, known as Alternative E-H ORIG. As currently described, Alternative E-H ORIG would further minimize wetland impacts compared to Alternative E-H with Option 6TR, which is NCDOT's preferred alternative.
- Memorandums of Agreement will be prepared between the US Army Corps of Engineers, the State Historic Preservation Office, and NCDOT for Mount Ararat AME Church and archaeological site 31PD344\*\*. The US Army Corps of Engineers will serve as the lead federal agency with respect to compliance with Section 106 of the National Historic Preservation Act.
- The preliminary traffic noise analysis conducted for the project found six locations where noise barriers may be feasible and reasonable. A more detailed review will be completed during project final design to determine whether these or other noise barriers are feasible and reasonable.
- The red knot and the northern long-eared bat are proposed for listing by the USFWS as threatened and/or endangered species. The listings may become effective as soon as October 2014. These species are not included in USFWS's current list of protected species for New Hanover and Pender Counties. NCDOT is working closely with USFWS to understand how these proposed listings may impact NCDOT projects. NCDOT will continue to coordinate appropriately with USFWS to determine if this project will incur potential effects to the red knot and northern long-eared bat, and how to address these potential effects, if necessary.

## **PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS UNIT AND ROADWAY DESIGN UNIT**

NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all service road options have been explored.

## **ROADWAY DESIGN UNIT, HYDRAULICS UNIT, ROADSIDE ENVIRONMENTAL UNIT AND DIVISION 3**

- Howe Creek has been designated an outstanding resource water (ORW) by the North Carolina Division of Water Resources (NCDWR). Tributaries of this stream (BDITCH1) are designated ORW due to the classification of their receiving waters. Design Standards in Sensitive Watersheds will be implemented for BDITCH1 during project construction.
- Old Topsail Creek and Nixons Creek are designated as Commercial Shellfishing, High Quality Waters (SA; HQW) by NCDWR. Tributaries of these streams (NSA, NSF, NDITCH1 and ZTRIB1) are designated SA; HQW due to the classification of their receiving waters. Design Standards in Sensitive Watersheds will be implemented for these streams during project construction.

## **ROADWAY DESIGN UNIT AND HYDRAULICS UNIT**

3:1 slopes are proposed in wetland areas and adjacent to streams.

## **DIVISION 3 CONSTRUCTION**

- Areas within 750 feet of Cape Fear Public Utility Authority (CFPUA) wellheads will be treated as environmentally sensitive areas during construction. NCDOT will require the contractor to use orange fencing and post signs to identify these areas as environmentally sensitive. Staging areas and refueling will not be permitted within the environmentally sensitive areas.
- No right-of-way acquisition or construction will occur within a 100-foot radius around the Belvedere Subdivision well and access to the well site will be maintained. The well is located between existing US 17 and Belvedere Drive.

## **ROADWAY DESIGN UNIT AND DIVISION 3**

- The Special Provisions for the Military Cutoff Road Extension (Project U-4751) will include a requirement for the contractor to educate their employees that project construction is occurring within a wellhead protection area.
- NCDOT will require the contractor for Military Cutoff Road Extension to provide a mobile response spill kit on site during construction. At the end of project construction the kit will be transferred to the Cape Fear Public Utility Authority. The CFPUA has agreed to provide a place to store the kit at their water treatment plant located adjacent to the proposed Military Cutoff Road Extension.

## **ROADWAY DESIGN UNIT AND TRANSPORTATION PROGRAM MANAGEMENT**

- NCDOT will coordinate with local officials as the project progresses regarding the status of local greenway plans and proposed walking trails.
- The Wilmington Metropolitan Planning Organization (MPO) has requested the inclusion of a multi-use path along proposed Military Cutoff Road Extension. The multi-use path would tie into an existing multi-use path along Military Cutoff Road. The construction of a multi-use path as part of the proposed project will be dependent upon a cost-sharing and maintenance agreement between NCDOT and the Wilmington MPO. NCDOT will continue to coordinate with the Wilmington MPO on the inclusion of the multi-use path along Military Cutoff Road Extension.

## **ROADWAY DESIGN UNIT AND UTILITIES SECTION**

NCDOT will coordinate with the Pender County School System regarding impacts of the proposed Hampstead Bypass on the Topsail Schools complex's wastewater treatment facility during the project's right-of-way phase

## **ROADWAY DESIGN UNIT**

- Well locations and a 100-foot buffer around the wells will be depicted on final constructions plans for proposed Military Cutoff Road Extension.
- NCDOT will further investigate ways to avoid impacts to the Corbett Tract and the Plantation Road Mitigation sites during detailed project design. If possible, no right-of-way will be acquired from these sites.
- The U-turn bulb-out on Military Cutoff Road Extension just north of the Cape Fear Public Utility Authority Nano Water Treatment Plant will not be placed in the adjacent wetland (Wetland CWA).

## **HYDRAULICS UNIT**

- The Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), the delegated state agency for administering FEMA's National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with FMP (dated April 22, 2013), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).
- NCDOT will review the existing permit requirements for all stormwater ponds impacted by Military Cutoff Road Extension to ensure the permitted treatment requirements are maintained under post-construction conditions.

## **ROADWAY DESIGN UNIT AND STRUCTURE DESIGN UNIT**

- Bicycle safe bridge railing will be provided on the NC 210 bridge over the US 17 Hampstead Bypass. Four-foot paved shoulders will be provided on NC 210 within the project limits.

- A retaining wall will be provided on the west side of proposed Military Cutoff Road Extension south of Putnam Drive to avoid impacts to Wetland PD-01.
- The use of retaining walls will be evaluated at stormwater ponds BPE and BPF, which are located on the east side of Military Cutoff Road Extension between Lendire Road and Torchwood Boulevard.

### **DIVISION 3**

This project involves construction activities on or adjacent to FEMA-regulated stream(s). Therefore, the Division shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

### **GEOTECHNICAL UNIT**

Military Cutoff Road Extension may impact five properties that either have or formerly had underground storage tanks. US 17 Hampstead Bypass Alternative E-H may impact one property that either has or formerly had underground storage tanks. Preliminary site assessments to identify the nature and extent of any contamination will be performed at any potential hazardous materials sites prior to right-of-way acquisition.

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# SUMMARY

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## S.1 TYPE OF ACTION

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Administrative Action Environmental Impact Statement

( ) Draft (X) Final

## S.2 CONTACT

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## S.3 PROJECT BACKGROUND AND HISTORY SINCE THE RELEASE OF THE DEIS

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The Draft Environmental Impact Statement (DEIS) for North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program (STIP) projects U-4751 (Military Cutoff Road Extension) and R-3300 (US 17 Hampstead Bypass) was approved in July 2011. The project vicinity map for the proposed projects is shown on Figure S-1. The DEIS analyzed five detailed study alternatives (M1+E-H, M2+O, M1+R, M1+U, and M2+U) for the proposed project, but did not recommend a preferred alternative. The DEIS detailed study alternatives are shown on Figure S-2.

Corridor public hearings were held for the project in October 2011 following distribution of the DEIS. The purpose of the corridor public hearings was to obtain public input on the alternative corridors being considered for the project. At the hearings, the public expressed concern related to the location of the northernmost interchange for the US 17 Hampstead Bypass, with most stating the lack of direct access to existing US 17 from the bypass at the northern end of the project was unacceptable. Based on the public's concern related to the lack of direct access to existing US 17 from the Hampstead Bypass at the northern end of the project, the project team considered additional northern interchange options for the proposed bypass.

At a National Environmental Policy Act (NEPA)/Section 404 merger team meeting held on May 17, 2012, NCDOT recommended Alternative M1+E-H as the preferred alternative for the proposed Military Cutoff Road Extension (U-4751) and US 17

Hampstead Bypass (R-3300) projects (see Figure S-3). The merger team concurred on NCDOT's preferred alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA) for the proposed project at this meeting in accordance with the procedures detailed in the NEPA/Section 404 Merger Process<sup>1</sup>.

Since the approval of the DEIS and the selection of the NCDOT's preferred alternative at the May 2012 merger team meeting, an additional interchange was added to the northern end of the proposed US 17 Hampstead Bypass in response to public comments on the DEIS detailed study alternatives. An additional lane in each direction is also proposed along the bypass from the northern interchange as described in the DEIS to the northern project terminus. This portion of the project was described as a four-lane roadway in the DEIS. The changes to the project that occurred since the release of the July 2011 DEIS were described in a Supplemental Draft Environmental Impact Statement (SDEIS) for STIP projects U-4751 and R-3300 released in September 2013. The SDEIS included a discussion of the history and rationale for these changes, as well as an updated impact evaluation. The SDEIS also presented information related to 14 potential service road locations under consideration for Military Cutoff Road Extension and US 17 Hampstead Bypass, as well as new information and conditions relevant to environmental concerns resulting in additional impacts not evaluated in the DEIS. Information from the SDEIS is incorporated into this Final Environmental Impact Statement (FEIS).

Because the merger team's LEDPA decision involves selection of a corridor rather than a specific project design, the changes to the proposed project described in the SDEIS do not invalidate the merger team's concurrence on Alternative M1+E-H as the LEDPA. Section 2.9 provides additional information regarding the validity of the LEDPA decision. As discussed in Section 2.9, the merger team reaffirmed its concurrence on Alternative M1+E-H as the LEDPA for the project, as well as the selection of Alternative M1+E-H as NCDOT's preferred alternative, via an e-mail exchange completed on April 30, 2014. The proposed changes to the project as documented in the SDEIS are consistent with the project's purpose and need.

Since the release of the SDEIS, NCDOT completed service road studies evaluating the cost effectiveness of the 14 potential service roads. The ten proposed service roads for

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<sup>1</sup>The merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by the US Army Corps of Engineers (USACE) as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."



the two projects determined to be cost effective (two for Military Cutoff Road Extension and eight for US 17 Hampstead Bypass) are further evaluated from an environmental standpoint in this FEIS. A merger team meeting was held on January 22, 2014 to discuss the proposed service roads, as well as potential service road avoidance and minimization measures. At this meeting, the merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the eight proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored.

Since the release of the SDEIS, the final design team also has proposed to realign Lendire Road to form an intersection with Middle Sound Loop Road at Market Street. The proposed improvements are expected to improve traffic operations along the Market Street corridor by eliminating the existing unsignalized T-intersection at Lendire Road and Market Street. The Middle Sound Loop Road/Market Street intersection is currently a four-legged intersection, with Middle Sound Loop Road “stubbed-out” approximately 400 feet to the west of Market Street. The Lendire Road realignment will tie into the stubbed-out section of Middle Sound Loop Road. The proposed Lendire Road improvements and associated impacts are discussed in detail in this FEIS.

## **S.4 PROPOSED ACTION**

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### **S.4.1 DESCRIPTION OF PROPOSED ACTION**

State Transportation Improvement Program (STIP) projects U-4751 and R-3300 involve the construction of Military Cutoff Road Extension in New Hanover County and the US 17 Hampstead Bypass in New Hanover and Pender Counties, respectively. These projects are included in the 2012-2018 STIP.

For project U-4751, the North Carolina Department of Transportation (NCDOT) proposes to extend Military Cutoff Road as a six-lane divided roadway on new location from its current terminus at US 17 (Market Street) in Wilmington north to an interchange with the US 17 Wilmington Bypass (John Jay Burney Jr. Freeway). Limited and full control of access is proposed. For project R-3300, NCDOT proposes to construct the US 17 Hampstead Bypass as a freeway mostly on new location. The US 17 Hampstead Bypass will connect to the proposed Military Cutoff Road Extension at the existing US 17 Wilmington Bypass and extend to existing US 17 north of Hampstead (see Figure S-1). Full control of access is proposed for the US 17 Hampstead Bypass.

### **S.4.2 PURPOSE OF PROPOSED ACTION**

The purpose of the project is to improve the traffic carrying capacity and safety of the US 17 and Market Street corridor in the study area.

## **S.5 DETAILED STUDY ALTERNATIVES**

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The Draft Environmental Impact Statement (DEIS) for the proposed project was approved in July 2011. Alternatives considered in the DEIS for the proposed project included the No-Build Alternative, the Transportation Systems Management Alternative, the Travel Demand Management Alternative, the Mass Transit Alternative, and the build alternatives.

Preliminary build alternatives were established through an evaluation of suitability mapping based on available socioeconomic, cultural, and environmental resource data. Preliminary build alternatives that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified as detailed study alternatives. The detailed study alternatives selection process incorporated recommendations made by federal and state environmental regulatory and resource agencies and comments received from two citizens informational workshops held in April 2007.

Project alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis. The DEIS analyzed two detailed study alternatives for Military Cutoff Road Extension (U-4751) and four detailed study alternatives for Hampstead Bypass (R-3300). Military Cutoff Road Extension Detailed Study Alternatives M1 and M2 are new location alternatives in New Hanover County extending Military Cutoff Road from Market Street to the US 17 Wilmington Bypass. Hampstead Bypass Detailed Study Alternatives E-H, O, and R are new location alternatives extending from the US 17 Wilmington Bypass in New Hanover County to existing US 17 north of Hampstead near Sloop Point Loop Road in Pender County. Detailed Study Alternative U extends along existing US 17 from the tie-in of proposed Military Cutoff Road Extension (Alternative M1 or M2) to approximately two miles north of the New Hanover/Pender County line, then extends on new location to existing US 17 north of Hampstead near Sloop Point Loop Road in Pender County. The DEIS detailed study alternatives are shown on Figure S-2. Based on the combinations possible by combining the detailed study alternatives for the Military Cutoff Road Extension (M1 and M2) and the US 17 Hampstead Bypass (E-H, O, R, and U) portions of the project, the DEIS analyzed five detailed study alternatives for the overall project: M1+E-H, M2+O, M1+R, M1+U, and M2+U.

## **S.6 PREFERRED ALTERNATIVE**

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Following distribution of the July 2011 DEIS and the corridor public hearings in October 2011, NCDOT recommended Alternative M1+E-H as the preferred alternative for the proposed Military Cutoff Road Extension (U-4751) and US 17 Hampstead Bypass (R-3300) project at a NEPA/Section 404 merger team meeting on May 17, 2012. At this same meeting, the merger team concurred on NCDOT's preferred alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA) for the proposed project in accordance with the procedures detailed in the NEPA/Section 404 Merger

Process. According to the Merger Process, the LEDPA is the best solution to the problem satisfying the transportation need and considering environmental and community resources. As noted above, although the merger team concurred on Alternative M1+E-H as the LEDPA, the final decision on the LEDPA will not be made until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project. A copy of the merger team's signed LEDPA concurrence form is included in Appendix C.

In selecting its preferred alternative, NCDOT considered impacts calculated based on the proposed preliminary design available at that time. However, it is recognized the preliminary design will continue to be refined within the preferred alternative corridor through final design to address comments from environmental agencies and the public, and to avoid and minimize impacts. The reasons Alternative M1+E-H was selected as NCDOT's preferred alternative are discussed in detail in Section 2.7.

Following the selection of NCDOT's preferred alternative, the proposed project was reviewed for additional measures that could be incorporated into the preliminary design to further avoid and minimize impacts to the human and natural environment. The avoidance and minimization measures incorporated into the proposed project since the selection of NCDOT's preferred alternative are documented on the NEPA/Section 404 concurrence forms located in Appendix C. Additional avoidance and minimization measures to be evaluated for the proposed project are identified on the concurrence forms and documented in the project commitments. The avoidance and minimization measures incorporated into the preferred alternative to date are discussed in further detail in this FEIS.

Since the approval of the DEIS and selection of NCDOT's preferred alternative, an additional interchange was added to the northern end of the US 17 Hampstead Bypass portion of the preferred alternative in response to public comments on the DEIS detailed study alternatives. An additional lane in each direction is also proposed along the bypass from the northern interchange of the preferred alternative as described in the DEIS to the northern project terminus. This portion of the project was described as a four-lane roadway in the DEIS.

In addition, because the proposed Military Cutoff Road Extension and US 17 Hampstead Bypass will remove or diminish access for a number of properties that would otherwise be unaffected by the projects, NCDOT completed service road studies for both projects. A total of ten service roads were determined to be cost effective for the two projects – two for Military Cutoff Road Extension (SR1 and SR4) and eight for US 17 Hampstead Bypass (SR5, SR6, SR8, SR10, SR11, SR13, SR14, and SR16). The ten service roads determined to be cost effective have been incorporated into the preliminary design for the preferred alternative and are further evaluated from an environmental standpoint in this FEIS.

The changes discussed above to the proposed project since the release of the July 2011 DEIS were described in detail in the August 2013 SDEIS, and are discussed further in

this FEIS. Because the LEDPA decision involves selection of a corridor rather than a specific project design, the changes to the proposed project described in the SDEIS do not invalidate the reasons for the merger team's concurrence on Alternative M1+E-H as the LEDPA. Section 2.9 provides additional information regarding the validity of the LEDPA decision. As discussed in Section 2.9, the merger team reaffirmed its concurrence on Alternative M1+E-H as the LEDPA for the project, as well as the selection of Alternative M1+E-H as NCDOT's preferred alternative, via an e-mail exchange completed on April 30, 2014. The proposed changes to the project as documented in the SDEIS also were consistent with the project's purpose and need. NCDOT's preferred alternative is shown on Figure S-3.

## **S.7 SUMMARY OF IMPACTS**

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As stated previously, based on the combinations possible by combining the detailed study alternatives for the Military Cutoff Road Extension (M1 and M2) and the US 17 Hampstead Bypass (E-H, O, R, and U) portions of the project, the DEIS analyzed five detailed study alternatives for the overall project: M1+E-H, M2+O, M1+R, M1+U, and M2+U. Table S-1 provides a summary comparison of the impacts as a result of the preferred alternative and the DEIS detailed study alternatives.

The final design for Military Cutoff Road Extension is underway but not complete. The final design team has proposed to realign Lendire Road to form an intersection with Middle Sound Loop Road at Market Street. Although final design is underway for Military Cutoff Road Extension, the in-progress plans were not used to calculate impacts for the FEIS, with the exception of the proposed Lendire Road improvements, because the final design is incomplete. The in-progress plans were used for the Lendire Road improvements because this work is not included in preliminary design plans. Preliminary design plans were used to calculate impacts for the FEIS. Typically the final design is not available for use in calculating impacts for the FEIS, and it is not unusual for impacts to change between preliminary and final design because of changes in mapping and the addition of hydraulic design. The NEPA/Section 404 merger team will review and provide input on the development of the drainage design for NCDOT's preferred alternative (Alternative M1+E-H) at two additional merger team meetings scheduled during the development of the final design. Revised impacts based on the final design will be presented to the merger team at these meetings.

The impacts shown in Table S-1 for NCDOT's preferred alternative are based on the revised preliminary design including the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date. The impacts shown for the DEIS detailed study alternatives in Table S-1 have not been updated since the DEIS except as noted in the table. NCDOT's preferred alternative and the locations of the ten proposed service roads are shown on Figures 16A through 16G.

Table S-1. Summary Comparison of Alternatives

FEATURE <sup>1</sup>	Alternative				
	M1+E-H (Preferred Alternative) <sup>2</sup>	M2+O	M1+R	M1+U	M2+U
<b>Length (miles)</b>	22.27 <sup>3</sup>	16.6	17.1	18.0	16.8
<b>Delineated Wetland Impacts (acres)</b>	261.19	384.42	297.24	218.35	283.77
<b>Delineated Stream Impacts (linear feet)</b>	22,552	13,842	24,571	15,450	8,786
<b>Delineated Surface Water Impacts</b>					
• Ponds with a connection to tributary waters (acres)	3.61	1.90	1.76	1.89	1.89
• Ponds with no connection to tributary waters (acres)	1.42	2.42	2.42	1.88	1.88
• Tributary waters determined to be jurisdictional based on the presence of an OHWM (square feet/acres) <sup>4</sup>	31,583/0.725	Included in stream impacts in DEIS	Included in stream impacts in DEIS	Included in stream impacts in DEIS	Included in stream impacts in DEIS
<b>Displacements</b>					
• Residential	60	60	59	93	95
• Business <sup>5</sup>	35	76	76	91	91
• Non-profit	3	5	5	11	11
<b>Red-cockaded Woodpecker Cluster-Level Take</b>	1	1	1	1	1
<b>Other Federally-Protected Species Impacts</b>	1	3	3	1	1
<b>Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)</b>	4.33	42.94	5.01	3.24	34.40
<b>Prime and Unique Farmland Soils (acres)</b>	501 <sup>6</sup>	58	58	50	50
<b>Forest (acres)<sup>7</sup></b>	546.40	506.24	466.45	405.65	454.80
<b>100-Year Floodplain and Floodway Impacts (acres)<sup>8</sup></b>	33.08	25.48	25.48	22.20	22.20
<b>Historic Properties (no.)<sup>9</sup></b>	1	1	1	3	3
<b>Noise Receptor Impacts<sup>10</sup></b>	232	213	220	292	289

Table S-1. Summary Comparison of Alternatives *continued*

FEATURE <sup>1</sup>	Alternative				
	M1+E-H (Preferred Alternative) <sup>2</sup>	M2+O	M1+R	M1+U	M2+U
<b>Recorded and NRHP- Eligible Archaeological Sites (no.)<sup>11</sup></b>	1	1	1	1	1
<b>Wildlife Refuge/Game Lands (acres)</b>	0	0	0	0	0
<b>Recreational Areas/Parks (no.)</b>	0	0	0	0	0
<b>High Quality Waters Watershed (HQW, ORW, WS Protected or Critical Areas) (acres)</b>	20.72	9.6	9.6	12.4	12.4
<b>Public Water Supply Wells (100-foot Buffer)</b>	0	0	0	0	0
<b>Cemeteries (no.)</b>	2	2	2	5	5
<b>Potential UST/Hazmat Sites (no.)</b>	6	5	5	5	5
<b>Total Cost (in millions)<sup>12</sup></b>	\$458.9	\$376.3	\$372.9	\$416.5	\$410.6

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet.

<sup>2</sup>Impacts for NCDOT's preferred alternative are based on the revised preliminary design including the additional northern interchange, the proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date.

<sup>3</sup>This length includes proposed service roads.

<sup>4</sup>These waters are classified as 'Waters of the US' (impacts calculated in sq. ft.) and will not require compensatory mitigation.

<sup>5</sup>Includes corrections to the DEIS (see Section 4.1.3).

<sup>6</sup>NRCS impact calculation methodology changed in August 2012 (see Section 4.3.3). A similar increase would be expected for all of the DEIS detailed study alternatives using the new methodology.

<sup>7</sup>Includes corrections to the DEIS (see Section 4.5.2.1.2).

<sup>8</sup>Floodplain impacts reflect updated floodplain mapping from the North Carolina Flood Maps Data Service which became available since the release of the July 2011 DEIS.

<sup>9</sup>Impacts for M1+U and M2+U decreased since the DEIS because the preliminary design of Alternative U was revised to avoid Scotts Hill Rosenwald School.

<sup>10</sup>Impacts are based on the DEIS preliminary design with updates in accordance with the current (July 2011) NCDOT Traffic Noise Abatement Policy (see Table 4-3 in Section 4.3.1.1). A more detailed review of impacts will be completed during project final design and recommended noise barrier locations will be reviewed.

<sup>11</sup>An archaeological survey was completed since the DEIS and one NRHP-eligible archaeological site was identified that would be impacted by DEIS Detailed Study Alternatives M2+O and M1+R, as well as the preferred alternative.

<sup>12</sup>Includes corrections to the DEIS wetland and stream mitigation costs for all alternatives.

## **S.8 UNRESOLVED ISSUES**

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There are no unresolved issues per USACE's regulations at Title 33 Code of Federal Regulations Part 325 (33 CFR 325), Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*) and 33 CFR 230.

## **S.9 ACTIONS REQUIRED BY OTHER STATE AND FEDERAL AGENCIES**

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Construction of the preferred alternative will require the following environmental regulatory permits from the US Army Corps of Engineers (USACE) and the North Carolina Division of Water Resources (NCDWR):

- A Section 404 Permit from USACE is required for any activity occurring in water or wetlands that would discharge dredged or fill material into Waters of the United States and adjacent wetlands. An individual Section 404 permit will be required. USACE will determine final permit requirements.
- A Section 401 Water Quality Certification from NCDWR is required for activities that may result in discharge to Waters of the United States to certify the discharge will be conducted in compliance with applicable state water quality standards. The Section 401 Water Quality Certification will be required prior to issuance of the Section 404 permit.

The preferred alternative will require a Coastal Area Management Act (CAMA) consistency determination from the North Carolina Division of Coastal Management (NCDCM).

USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act (ESA). Under Section 7 of the ESA, formal consultation with the US Fish and Wildlife Service (USFWS) regarding the effects of the preferred alternative on the federally-protected red-cockaded woodpecker (RCW) and rough-leaved loosestrife is required. USACE will also serve as the lead federal agency with respect to compliance with Section 106 of the National Historic Preservation Act. USACE notified the Advisory Council on Historic Preservation (ACHP) of the adverse effect of the preferred alternative on the National Register-eligible Mount Ararat AME Church in a letter dated January 6, 2014 (see Appendix B). In their February 5, 2014 response (see Appendix B), ACHP concluded their further participation in the consultation to resolve the adverse effect is not required.

A Memorandum of Agreement (MOA) will be prepared between USACE, the State Historic Preservation Office (HPO), and NCDOT outlining mitigation measures for the adverse effect. A MOA will also be prepared between USACE, HPO, and NCDOT outlining the mitigation measures for the preferred alternative's adverse effect on a National Register-eligible archaeological site (31PD344\*\*).

These same actions would be required for the other DEIS detailed study alternatives. No other federal actions would be required for implementation of the preferred alternative.



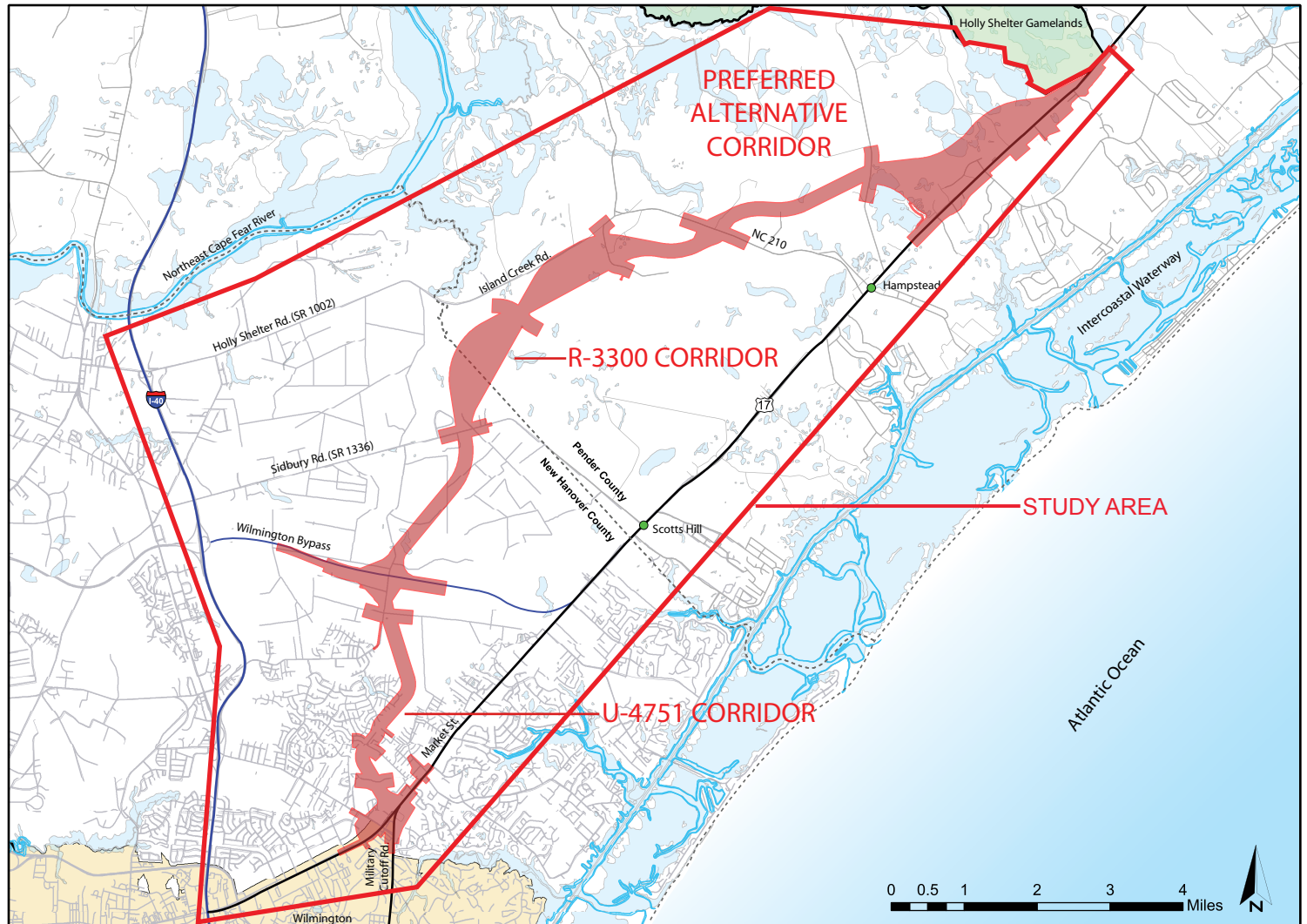
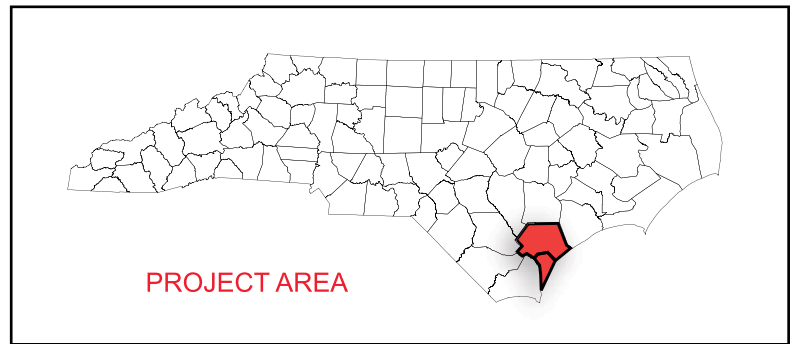
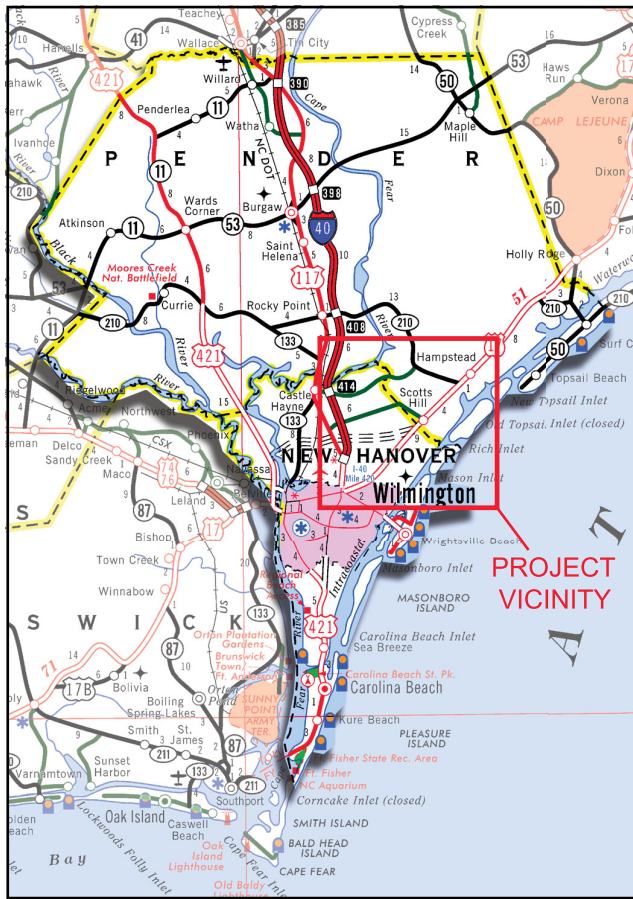
Figure S-1

## PROJECT VICINITY

US 17 Corridor Study  
NCDOT TIP Nos. U-4751 and R-3300  
New Hanover and Pender Counties



North Carolina  
Department of Transportation

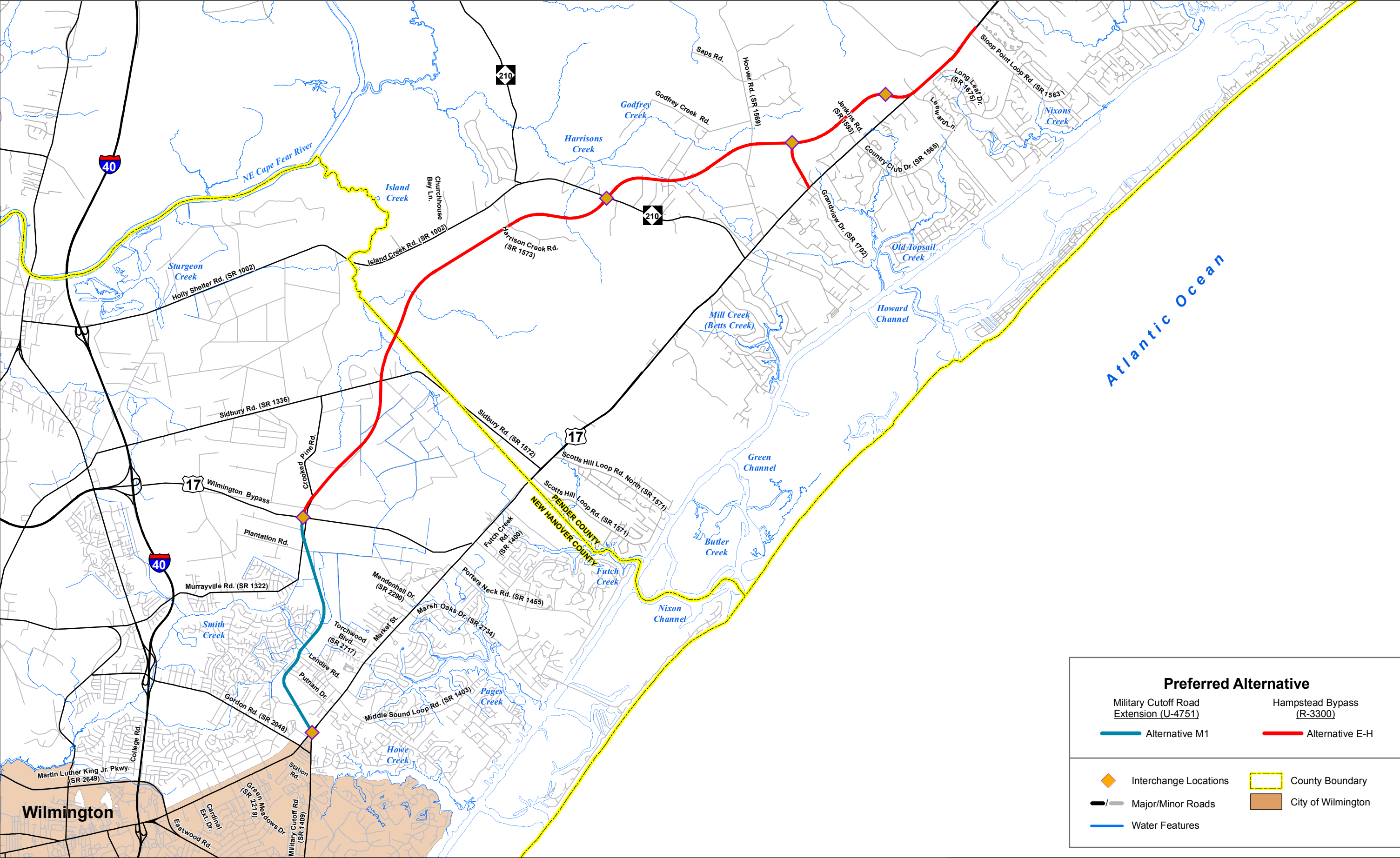




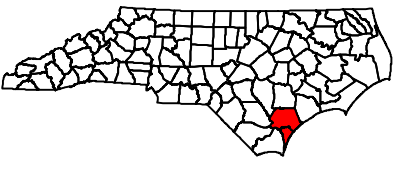








Prepared by:   
Prepared for: 



**Preferred Alternative**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

0 3,450 6,900 13,800 Feet  
Data Sources: NCDOT and Mulkey GIS  
Figure Prepared: 7/30/13



**Figure No.**  
**S-3**



## **1.0 PURPOSE OF AND NEED FOR PROJECT**

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State Transportation Improvement Program (STIP) projects U-4751 and R-3300 involve the construction of Military Cutoff Road Extension in New Hanover County and the US 17 Hampstead Bypass in New Hanover and Pender Counties, respectively. These projects are included in the 2012-2018 STIP. This Final Environmental Impact Statement (FEIS) is being prepared for both projects in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code 4321-4327), as codified in Title 40 of the Code of Federal Regulations Parts 1500-1508 and the North Carolina Environmental Policy Act of 1971, as amended (North Carolina General Statutes Article I Chapter 113A), as codified in the North Carolina Administrative Code, Title 1, Chapter 25.

### **1.1 PROPOSED ACTION**

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For project U-4751, the North Carolina Department of Transportation (NCDOT) proposes to extend Military Cutoff Road as a six-lane divided roadway on new location from its current terminus at US 17 Business (Market Street) in Wilmington north to an interchange with the US 17 Wilmington Bypass (John Jay Burney Jr. Freeway). Limited and full control of access is proposed. For project R-3300, NCDOT proposes to construct the US 17 Hampstead Bypass as a freeway mostly on new location. The US 17 Hampstead Bypass will connect to the proposed Military Cutoff Road Extension at the existing US 17 Wilmington Bypass and extend to existing US 17 north of Hampstead. Full control of access is proposed for the US 17 Hampstead Bypass.

The project vicinity and study area are shown on Figure 1. The project study area boundaries roughly follow I-40 to the west, the Northeast Cape Fear River to the north, Holly Shelter Game Land to the east, and existing US 17 to the south.

#### **1.1.1 PROJECT SETTING**

##### **1.1.1.1 DESCRIPTION OF PROJECT AREA**

The proposed projects are located in the outer Coastal Plain and cross portions of northern New Hanover County and southern Pender County. This part of the Cape Fear River basin is the only coastal area in North Carolina accessible by interstate highway, making it a popular destination because of its proximity to the Atlantic Ocean, beaches, and estuarine waters. In the project vicinity, the City of Wilmington is home to one of the state's largest historic districts and the USS North Carolina battleship and memorial. Wilmington and nearby communities of Hampstead, Topsail Island, Wrightsville Beach, Kure Beach, and Carolina Beach offer numerous options for dining, shopping, recreation, and entertainment. The Hampstead area is home to four golf courses centered in large residential developments. Proximity to numerous coastal communities makes this area a popular second-home and retirement destination.

The southern extent of the study area is characterized primarily by a mix of commercial and residential development; the northern extent includes preserved land, undeveloped forests, open fields, and wetlands. Natural areas preserved for recreation and education uses include the North Carolina Wildlife Resources Commission Holly Shelter Game Land and the North Carolina State University blueberry research station. Open fields are primarily managed agricultural areas used for blueberries, row crops, and tobacco production, or are left fallow.

#### **1.1.1.2 EXISTING TRANSPORTATION FACILITIES**

US 17 serves as a major connector between New Hanover, Pender, and Onslow Counties. In the study area, US 17 connects with I-40 and US 17 Business (Market Street) at interchanges and with NC 210 at a signalized intersection (see Figure 1). From I-40 to Market Street, US 17 is also known as the Wilmington Bypass. The US 17 Wilmington Bypass is a four-lane freeway with a posted speed limit of 65 miles per hour (mph). The US 17 Wilmington Bypass opened to traffic in 2006. From its interchange at Market Street to Sloop Point Loop Road, US 17 is a four or five-lane, two-way, north-south route classified as an urban principal arterial in the Statewide Functional Classification System. US 17 between the Wilmington Bypass and Sloop Point Loop Road was widened from two to four and five lanes between 1996 and 1999 and intersections along US 17 between the Wilmington Bypass and the northern intersection of SR 1571 (Scotts Hill Loop Road) were upgraded to “superstreet” intersections (no left turns onto US 17) in 2006. The posted speed limit varies from 45 to 55 mph. US 17 is a part of NC Bike Route 3 in the vicinity of Hampstead.

In the study area, US 17 Business (Market Street) extends from US 117/NC 132 (College Road) to the US 17 Wilmington Bypass. Land use along Market Street includes commercial, retail, and single-family and multi-family residential development. Market Street is a four or five-lane roadway within the study area. The posted speed limit varies from 45 to 55 mph.

In the study area, Military Cutoff Road is a four-lane divided or five-lane, north-south route with a posted speed limit of 45 mph. Military Cutoff Road is classified as an urban principal arterial in the Statewide Functional Classification System. Military Cutoff Road connects with Gordon Road and Market Street at signalized intersections. Gordon Road, an east-west urban minor arterial, connects with I-40 at an interchange.

I-40 is a major east-west freeway that crosses eight states, beginning in Barstow, California and ending in Wilmington, North Carolina. It links several large cities in the state, including Asheville, Winston-Salem, Greensboro, Durham, and Raleigh. NC 210 is a two-lane, east-west major arterial serving as a connector between Cumberland, Bladen, and Pender Counties. In the study area, NC 210 connects with US 17 in Hampstead and I-40 via Holly Shelter Road. NC 210 provides access to the Topsail Island beaches.



### **1.1.2 HISTORY OF PROJECT**

Feasibility studies were conducted for both Military Cutoff Road Extension and the US 17 Hampstead Bypass. The Hampstead Bypass Feasibility Study was completed in draft form in February 1999, but was never published as final. In early 2004, the feasibility study was reinstated. A Feasibility Study for the Military Cutoff Road Extension was completed in June of 2004. The proposed project is included in local thoroughfare plans and shown in the 2012-2018 STIP, with both U-4751 and R-3300 shown as Strategic Highway Corridor projects. Project development studies for the proposed project began in 2005.

### **1.1.3 DECISION TO COMBINE PROJECTS IN ONE ENVIRONMENTAL DOCUMENT**

During project development it was recognized that projects U-4751 and R-3300 may share a common terminus. Because they may be adjoining new location projects and together they would have a cumulative impact on the human and natural environment, it was decided the two projects should be addressed in a single environmental document. This combined document provides a way to communicate all direct and indirect impacts the projects would have on the environment, as well as the cumulative impact resulting from the incremental impacts of the two projects when added to other past, present, and reasonably foreseeable future actions.

## **1.2 PURPOSE OF PROPOSED ACTION**

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The purpose of the project is to improve the traffic carrying capacity and safety of the US 17 and Market Street corridor in the study area. The project is expected to provide the following benefits:

- **Improve traffic flow and level of service on US 17 and Market Street in the study area.**

The proposed projects will increase the capacity of the US 17 corridor and improve level of service, benefiting both local and through traffic. The proposed project will provide a new route for travelers with destinations in northern New Hanover County and area beaches. The project will remove much of the through traffic from the existing roadway, allowing it to better serve local land use.

- **Enhance safety along US 17 and Market Street in the study area.**

Separating through traffic from the local traffic that is using the existing roadway to access schools, shopping, and residential areas will enhance safety.

### **1.3 NEED FOR PROPOSED ACTION**

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The following summary and supporting technical data for existing and forecasted conditions in the study area detail the need for improvements along the US 17 corridor in New Hanover and Pender Counties.

#### **1.3.1 SUMMARY OF NEED FOR PROPOSED ACTION**

Needs to be addressed by the proposed projects are:

- **Traffic Carrying Capacity**

Traffic volumes on US 17 in the project vicinity are expected to increase substantially over the next 25 years. Average daily traffic volumes along existing roads within the study area are projected to more than double in some locations by 2035 from the 2008 base conditions. Roadway capacity analyses show that most of the arterials and intersections within the study area would either approach or exceed the roadway capacity limits during at least one peak hour of the day in 2035.

- **Safety Issues**

An updated accident analysis using the most recently available crash data (July 1, 2008 to June 30, 2013) was conducted for US 17, US 17 Business (Market Street), and Military Cutoff Road within the project area. The results of the updated accident analysis support the DEIS findings that all three existing roadway facilities have total crash rates higher than North Carolina statewide crash rates for comparable roadways.

A total of 131 crashes occurred on Military Cutoff Road between Station Road and US 17 Business (Market Street) between July 1, 2008 and June 30, 2013. The total crash rate for Military Cutoff Road in this area is above the 2009-2011 statewide crash rate for urban Secondary Routes.

A total of 1,089 crashes including six fatal crashes occurred on Market Street between Station Road and the US 17 Wilmington Bypass interchange at Market Street between July 1, 2008 and June 30, 2013. The total crash rate for Market Street in this area is above the 2009-2011 statewide crash rate for urban United States routes.

A total of 909 crashes including four fatal crashes occurred on US 17 between the US 17 Wilmington Bypass interchange at Market Street and Sloop Point Loop Road between July 1, 2008 and June 30, 2013. The total crash rate for US 17 in this area is above the 2009-2011 statewide crash rate for rural United States routes.

- **Transportation Demand**

US Census Bureau statistics indicate the population of New Hanover County grew by 33.3 percent from 1990 to 2000 and 22.3 percent between 2000 and 2010. Pender County's population grew by 42.4 percent between 1990 and 2000 and 32.9 percent between 2000 and 2010. Both counties are expected to continue to experience high

population growth rates through the year 2030. This growth in population, as well as tourism and supporting services, has resulted in an increase in mixed-purpose traffic on US 17.

### **1.3.2 TRAFFIC OPERATIONS ANALYSES**

#### **1.3.2.1 ANALYSIS METHODOLOGY**

The objective of the traffic operations analysis is to evaluate the existing and future travel conditions and to assess the effectiveness of the proposed Military Cutoff Road Extension and Hampstead Bypass in improving traffic flow within the study area. The analysis of future build travel conditions is discussed in Section 2.5.

The existing and future no-build travel conditions analysis evaluated freeway mainline, weaving and merge/diverge, arterial and intersection capacities for two conditions: 2008 Existing Conditions and 2035 No-Build Conditions. The capacity analysis was performed using the 2000 Highway Capacity Manual methodologies. The AM and PM peak hour traffic volumes from the traffic forecast prepared for the project were used in the capacity analysis.

Traffic forecasts for the base year (2008) and horizon year (2035) were prepared for the project in June 2008 using output from the Wilmington Metropolitan Planning Organization's (MPO) Travel Demand Model. The June 2008 traffic forecast is based on the latest official travel demand model. The travel demand model uses various socioeconomic data to forecast growth in order to predict demands on a transportation network. Regional growth expectations help to determine projected traffic in a horizon year. Assumptions about future development activity and changes in distribution of population and employment in the forecast study area are implicit in the model. Expectations regarding specific developments can be a factor in the development of the forecast. It is anticipated there will be periods where housing and employment market trends will fluctuate up and down through the horizon year. The future year Build scenario assumes completion of all projects in the fiscally constrained Wilmington MPO Comprehensive Transportation Plan adopted in March 2005.

Results of the traffic capacity analyses for the project are presented in this document in terms of level of service. Level of service (LOS) is a qualitative measure that characterizes the operational conditions within a traffic stream and the perception of traffic service by motorists and passengers. The Transportation Research Board's Highway Capacity Manual generally describes these conditions in terms of such factors as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience. Six levels are used, ranging from A to F. For roadways, LOS A indicates no congestion while LOS F represents more traffic demand than road capacity and extreme delays. The engineering profession generally accepts LOS D as a minimally acceptable operating condition for signalized intersections.

Freeway capacity analyses for the freeway mainline, merge/diverge junctions, and weaving segments were performed using the methodologies described in the 2000

Highway Capacity Manual. In this methodology, the LOS is determined by calculating the density of passenger cars per mile per lane.

The arterial capacity analyses were performed using Synchro software program and in accordance with the 2000 Highway Capacity Manual, which bases LOS on average through-vehicle travel speeds. The average through-vehicle speed is calculated by dividing the length of the segment by the sum of the travel time on that segment plus control delay. The control delay includes the total delay for a vehicle approaching and entering a signalized intersection, delays of initial deceleration, move-up time in the queue, stop, and re-acceleration.

The intersection capacity analyses were performed using Synchro software in accordance with NCDOT Signalized Intersection Capacity Analysis Guidelines. Traffic flow at an intersection is affected by the volume of traffic and by the intersection geometry. At intersections with signals, LOS A represents no congestion, LOS E represents long delays, and LOS F represents excessive delays with vehicles having to wait several signal cycles to clear an intersection.

#### **1.3.2.2 2008 TRAFFIC VOLUMES**

The 2008 ADT along Military Cutoff Road from south of Station Road to US 17 Business (Market Street) varies between 15,000 vehicles per day (vpd) and 34,000 vpd. Truck traffic makes up approximately three percent of the total traffic along Military Cutoff Road. The 2008 ADT along Market Street between US 117/NC 132 (College Road) and the US 17 Wilmington Bypass varies between 30,000 vpd and 52,900 vpd. Truck traffic makes up approximately six percent of the total traffic along this section. The 2008 ADT along US 17 between I-40 and Sloop Point Loop Road ranges between 15,000 vpd and 38,600 vpd. Truck traffic makes up approximately eight percent of the total traffic along this section. Figure 2 shows 2008 ADT.

#### **1.3.2.3 2008 LEVEL OF SERVICE**

Under the 2008 existing conditions, capacity analyses indicate that traffic demand along several segments of US 17 Business and Military Cutoff Road either approaches or exceeds the roadway capacity (LOS E or F) during at least one peak hour of the day. The intersection capacity analysis indicates that traffic demand at 24 out of 29 study intersections either approaches or exceeds the roadway capacity during at least one peak hour of the day. Figure 3 shows the 2008 levels of service for the existing facilities.

#### **1.3.2.4 2035 NO-BUILD TRAFFIC PROJECTIONS**

Projected 2035 ADT for Military Cutoff Road from south of Station Road to Market Street varies between 26,000 vpd and 46,000 vpd. Truck traffic is projected to make up approximately three percent of the total traffic along Military Cutoff Road in 2035. The 2035 ADT along Market Street between College Road and US 17 Wilmington Bypass is expected to range between 48,200 vpd and 71,000 vpd. Truck traffic is expected to make up approximately six percent of the total traffic along this section. Projected 2035

ADT for US 17 from I-40 to Sloop Point Loop Road varies between 62,800 vpd and 115,000 vpd. Truck traffic is expected to make up approximately eight percent of the total traffic along this section. Figure 4 shows 2035 ADT projections.

### 1.3.2.5 YEAR 2035 NO-BUILD CAPACITY ANALYSIS

Under the 2035 No-Build conditions, the US 17 interchanges at I-40 and US 17 Business will operate at or beyond capacity (LOS E or F). Freeway and arterial capacity analyses indicate that traffic demand at all of the segments along US 17, Market Street, and Military Cutoff Road will approach or exceed capacity during at least one peak hour of the day. The intersection capacity analysis indicates that traffic demand at 28 out of the 29 intersections studied will either approach or exceed capacity during at least one peak hour of the day. These capacity deficiencies indicate a need for roadway improvements within the study area to serve the anticipated future traffic demand. Figure 5 shows the 2035 level of service for the existing facilities.

### 1.3.3 ACCIDENT ANALYSIS

Traffic accident data was analyzed for the five year period between July 1, 2008 and June 30, 2013 for US 17, US 17 Business (Market Street), and Military Cutoff Road. The data is summarized in Tables 1-1 through 1-3 below. For each roadway segment, the crash rate for the total number of crashes and crashes by type are shown. These rates are compared to statewide and critical crash rates. The critical crash rate is a way to mathematically evaluate the significance of the crash rate for a section of roadway. Critical crash rate values vary as the average annual daily traffic (AADT) volumes change. The critical crash rate can be used to identify high accident locations. Locations with a crash rate higher than the critical rate may have potential highway safety deficiencies.

Rear-end collisions were the most common type of accident for all three of the roadways analyzed, accounting for between 42 percent and 52 percent of all accidents reported. Approximately one-third of all crashes involved injuries.

Table 1-1. Crash Rates - Military Cutoff Rd. from Station Rd. to US 17 Bus. (Market Street)

Crash Type	Crashes	Crash Rate <sup>1</sup>	Statewide Rate <sup>2</sup>	Critical Rate <sup>3</sup>
Total	131	412.78	297.70	349.66
Fatal	0	0.00	0.89	5.22
Non-Fatal Injury	46	144.95	91.74	121.28

<sup>1</sup>Crashes per 100 million vehicle miles driven.

<sup>2</sup>2009-2011 statewide crash rate for urban Secondary Routes (SR) in North Carolina.

<sup>3</sup>Based on the statewide crash rate (95% level of confidence).

Table 1-2. Crash Rates - US 17 Bus. (Market St.) from Station Rd. to US 17 Wilmington Bypass

Crash Type	Crashes	Crash Rate <sup>1</sup>	Statewide Rate <sup>2</sup>	Critical Rate <sup>3</sup>
Total	1,089	367.88	245.51	260.66
Fatal	6	2.03	0.86	1.92
Non-Fatal Injury	289	97.63	77.64	86.23

<sup>1</sup>Crashes per 100 million vehicle miles driven.

<sup>2</sup>2009-2011 statewide crash rate for urban United States (US) routes in North Carolina.

<sup>3</sup>Based on the statewide crash rate (95% level of confidence).

Table 1-3. Crash Rates - US 17 from US 17 Wilmington Bypass to Sloop Point Loop Rd.

Crash Type	Crashes	Crash Rate <sup>1</sup>	Statewide Rate <sup>2</sup>	Critical Rate <sup>3</sup>
Total	909	157.41	128.58	136.43
Fatal	4	0.69	1.01	1.79
Non-Fatal Injury	268	46.41	38.24	42.56

<sup>1</sup>Crashes per 100 million vehicle miles driven.

<sup>2</sup>2009-2011 statewide crash rate for rural United States (US) routes in North Carolina.

<sup>3</sup>Based on the statewide crash rate (95% level of confidence).

#### 1.3.4 TRANSPORTATION DEMAND

Increases in population can be expected to result in increased demand on roadways. Table 1-4 shows US Census Bureau statistics for recent and future projected population growth for the State of North Carolina, New Hanover and Pender Counties, and the demographic area. The demographic area consists of the US Census block groups in the vicinity of the project study area from which data was used to identify population trends and projections. As shown in Table 1-4, the historic 2000 to 2010 population growth rate in both counties and the demographic area was substantially higher than the State's population growth rate. Future population growth in New Hanover and Pender Counties through 2030 is expected to be at or above the State's population growth rate.

The demographic area is expected to continue to grow at a rate over double the State's growth rate through 2030.

Table 1-4. Population Growth Trends

	Population Percent Change		
	2000 – 2010	2010 – 2020*	2020 – 2030*
North Carolina	18.5%	11.5%	10.2%
New Hanover County	26.4%	18.7%	15.9%
Pender County	27.1%	16.8%	10.1%
Demographic Area	41.4%	29.7%	24.6%

Source: US Census Bureau and NC Office of State Budget and Management.

\*Projected growth.

The *Cape Fear Commutes 2035 Transportation Plan, Final Report* (Wilmington MPO, December 2010) notes the Wilmington Metropolitan Statistical Area (MSA) is the 24<sup>th</sup> fastest growing urban area in the U.S. The transportation plan also indicates that by 2035, the population of Pender County is projected to more than triple (from its 2008 level) and the population of New Hanover County is projected to increase by approximately 67 percent during the same period.

Growth in tourism also can be expected to result in increased demand on roadways. According to “The 2008 Economic Impact of Travel on North Carolina Counties”, a study prepared for the North Carolina Division of Tourism, Film and Sports Development by the US Travel Association, New Hanover County ranks eighth among North Carolina’s 100 counties in tourism expenditures. This ranking reflects the large number of annual visitors to the area, which creates increased demands on local roads. In addition, as a result of the growth in population and tourism within the study area, there is a corresponding growth in the need for goods and services. This further increases the number of local and regional trips on the study area road network.





## **2.0 DESCRIPTION OF ALTERNATIVES CONSIDERED**

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Alternatives considered for the proposed project include the No-Build Alternative (Section 2.1), the Transportation Systems Management Alternative (Section 2.2.1), the Travel Demand Management Alternative (Section 2.2.2), Mass Transit Alternatives (Section 2.2.3), and the build alternatives, including the Improve Existing Alternative (Alternative Z).

Preliminary build alternatives (Section 2.2.4) were established through an evaluation of suitability mapping based on available socioeconomic, cultural, and environmental resource data. Preliminary build alternatives that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified as detailed study alternatives in August 2007 (Section 2.3). The August 2007 detailed study alternatives selection process incorporated recommendations made by federal and state environmental regulatory and resource agencies and comments received from two citizens informational workshops held in April 2007.

The August 2007 detailed study alternatives were further refined as more comprehensive information was obtained through detailed field studies and environmental analysis. Following detailed environmental surveys and preliminary detailed designs, seven new location build alternatives for the Hampstead Bypass (R-3300) were dropped from consideration (see Section 2.3). Four new location build alternatives for the Hampstead Bypass (R-3300) and two new location build alternatives for Military Cutoff Road Extension (U-4751) were selected to be carried forward in the DEIS. The DEIS detailed study alternatives are discussed in Section 2.4. These DEIS detailed study alternatives were presented to the public at corridor public hearings held in October 2011. Following distribution of the July 2011 DEIS and the October 2011 corridor public hearings, NCDOT selected Alternative M1+E-H as the preferred alternative for the proposed Military Cutoff Road Extension (U-4751) and US 17 Hampstead Bypass (R-3300). The reasons Alternative M1+E-H was selected as NCDOT's preferred alternative are discussed in Section 2.7. The NEPA/Section 404 merger team concurred on NCDOT's preferred alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA) for the proposed project at a merger team meeting held on May

17, 2012, in accordance with the procedures detailed in the NEPA/Section 404 Merger Process<sup>1</sup>.

Since the approval of the DEIS and the selection of Alternative M1+E-H as NCDOT's preferred alternative, changes have been made to the design of Alternative M1+E-H. However, Alternative M1+E-H is described in Section 2.4 of this document as it was proposed prior to its selection as the preferred alternative. Changes which have occurred to the alternative since it was selected are discussed in Section 2.8. Although these changes have resulted in increased wetland and stream impacts, these design changes do not invalidate the selection of Alternative M1+E-H as the preferred alternative. Many of these same changes would have been required with any of the other DEIS detailed study alternatives, as well. A supplemental draft environmental impact statement (SDEIS) was prepared in October 2013 to address the design changes in the preferred alternative. Section 2.9 further discusses the validity of the NEPA/Section 404 merger team's LEDPA decision. The current project schedule and cost estimates for the preferred alternative are discussed in Section 2.13.

## **2.1 NO-BUILD (NO ACTION) ALTERNATIVE**

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The No-Build Alternative would not provide any substantial improvements to US 17 or Market Street (US 17 Business) within the study area through the year 2035. Only typical maintenance activities such as patching, resurfacing, regrading shoulders, and maintaining ditches would occur.

The No-Build Alternative would not affect the human or natural environments. There would be no impacts to streams, wetlands, historic resources, protected species, or other cultural or natural resources. The No-Build Alternative would not result in any residential or business relocations, nor would there be any right-of-way or construction costs.

As discussed in Section 1.3.2, traffic capacity analyses indicate that by 2035 all of the roadway segments along Market Street and US 17 analyzed for the project would approach or exceed the roadway capacity limits during at least one peak hour of the day.

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<sup>1</sup>The merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by the US Army Corps of Engineers (USACE) as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."

The No-Build Alternative would not add new lanes or provide alternative routes or means of travel to existing roadways. Therefore, the traffic carrying capacity of Market Street and US 17 would not improve and an increase in the number of accidents could be expected. Therefore, the No-Build Alternative does not meet the purpose of and need for the proposed project and has been removed from further consideration.

As stated above, under the No-Build Alternative no transportation improvements would be made to US 17 or Market Street within the project area beyond routine maintenance. However, for the purposes of the USACE review, and consistent with Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*) of its regulations at 33 CFR 325, USACE defines the No Action alternative as follows:

“The ‘no-action’ alternative is one which results in no construction requiring a Corps permit. It may be brought by (1) the applicant electing to modify his proposal to eliminate work under the jurisdiction of the Corps or (2) by the denial of the permit.”

Based on the information available concerning the location and extent of the streams and wetlands within the project area, it is believed that to modify the proposed highway facility in order to completely avoid impacts to jurisdictional waters and wetlands, and thus preclude the need for a USACE permit, would not be practicable and thus does not satisfy the purpose and need for the project.

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## **2.2 PRELIMINARY STUDY ALTERNATIVES**

### **2.2.1 TRANSPORTATION SYSTEMS MANAGEMENT (TSM) ALTERNATIVE**

Transportation Systems Management (TSM) improvements involve increasing the available capacity of a roadway within the existing right-of-way with minimum capital expenditures and without reconstructing or adding additional through lanes to the existing road. There are two types of TSM roadway improvements: operational and physical improvements. Physical improvements are usually more capital intensive while operational changes are largely administrative in nature.

Items such as the addition of turn lanes, striping, signing, signalization, and minor realignments are examples of TSM physical improvements. Physical TSM improvements are most effective in addressing site-specific capacity and safety issues. It is expected that TSM physical improvements would improve traffic flow in some areas along Market Street and US 17, but the roadways would not show an appreciable increase in capacity.

Examples of TSM operational improvements include traffic law enforcement, speed restrictions, access control, and signal timing changes. These types of improvements are best suited for areas with capacity or safety deficiencies in specific locations. A current STIP Project (U-4902) involves access management improvements to Market Street. It is expected that TSM operational improvements would improve traffic flow along

Market Street. However, it is expected that Market Street and US 17 would not show an appreciable increase in capacity in design year 2035 with TSM operational improvements.

TSM improvements would not add new lanes or provide alternative routes or means of travel to existing roadways. Therefore, the traffic carrying capacity of Market Street and US 17 would not improve and an increase in the number of accidents could be expected. Therefore, the TSM Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

### **2.2.2 TRAVEL DEMAND MANAGEMENT (TDM) ALTERNATIVE**

Travel Demand Management (TDM) is an innovative approach to mitigating traffic congestion. Examples of TDM alternatives include ridesharing, park & ride, flexible work schedules, and telecommuting programs. Ridesharing provides a vehicle option for people who normally travel via public transportation and non-motorized modes, but at times need to make special trips (e.g., grocery shopping, trips to rural areas, trips from a transit station to a final destination). Employers who provide flexible work schedules allow employees to choose their arrival and departure times, which may reduce peak travel demand by allowing employees to avoid the most congested travel times or more easily coordinate carpools and vanpools. Telecommuting allows employees to work from home. Because telecommuters are not traveling between home and work, travel demand may be reduced, particularly during peak hours. Traffic projections prepared for this project have considered the effects of local government TDM policies and local businesses' policies.

TDM improvements would not add new lanes or provide alternative routes or means of travel to existing roadways. Therefore, the traffic carrying capacity of Market Street and US 17 would not improve and an increase in the number of accidents could be expected. Therefore, the TDM Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

### **2.2.3 MASS TRANSIT ALTERNATIVES**

Mass transit alternatives include bus services, rail services, and express lanes. The study area is not currently served by passenger rail service. There is one inactive railroad within the study area and one active railroad in the project vicinity. The inactive line extends from Craven County to northern Brunswick County and parallels US 17 within the study area. The active line is operated by CSX and extends from the North Carolina-Virginia state line in Northampton County southward to Wilmington, offering freight services only.

The Cape Fear Public Transportation Authority (Wave Transit) provides transit services in Wilmington, most of New Hanover County, and portions of Brunswick County. Through Wave Transit a variety of public transportation options are available, including fixed bus routes, paratransit vans, the Front Street free trolley (serving downtown

Wilmington), Seahawk shuttle (serving the University of North Carolina Wilmington [UNC-W] campus), Castle Hayne shuttle, Brunswick Connector, and Columbus Connector. Wave Transit Northeast Route travels along Gordon Road, crossing Market Street and continuing on Military Cutoff Road south of the study area. Intercity bus services are provided by Greyhound Bus Lines and Carolina Trailways. Pender County does not currently have public transit operations in place. Pender Adult Services, Inc., (PAS) operates the Pender Transit System, which provides both human service agency sponsored transit services and general public transportation services. PAS is a non-profit organization funded by government grants and charitable contributions.

Current roadway access and land use along Market Street and US 17 is not conducive to converting lanes on Market Street and US 17 to express lanes.

The Mass Transit Alternative would only minimally address the current traffic flow problems in the area. In addition, it would not be a reasonable alternative because of potential lack of demand, dispersed residential areas and employment centers, and diversity of trip origins and destinations. The Mass Transit Alternative does not meet the purpose of and need for the proposed project and has been eliminated from further consideration.

#### **2.2.4 PRELIMINARY BUILD ALTERNATIVES**

The NEPA/Section 404 merger team reviewed preliminary build alternatives at three meetings between February 2007 and August 2007. During these meetings, the merger team eliminated alternatives from further consideration, added alternatives for evaluation, and combined some alternatives. In total, 23 preliminary build alternatives were developed for Hampstead Bypass and two preliminary build alternatives were developed for Military Cutoff Road Extension. Preliminary build alternatives are described below and shown on Figure 6. A comparison of the preliminary build alternatives in relation to environmental features is shown in Table 2-1.

##### **2.2.4.1 HAMPSTEAD BYPASS ALTERNATIVES**

###### **Alternative A**

Alternative A begins in New Hanover County at the I-40 interchange with SR 1002 (Holly Shelter Road). It extends northeast across undeveloped property just north of Holly Shelter Road. Alternative A crosses over to the south side of Holly Shelter Road at the curve where it transitions to Island Creek Road. The alternative follows closely along the south side of Island Creek Road adjacent to mostly undeveloped property. Alternative A crosses a transmission line easement and turns southeast to an interchange with NC 210 southeast of the intersection of NC 210 and Island Creek Road.

Alternative A then extends from NC 210 to the northeast through undeveloped forested property, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative A extends through more forested land, crosses Saps Road and SR 1569 (Hoover Road), and then turns east. The alternative then extends to

the north of Castle Bay, an existing residential golf course community off of Hoover Road. It continues east to a proposed interchange with US 17 near SR 1675 (Long Leaf Drive), then extends along existing US 17 to end at a signalized intersection at SR 1563 (Sloop Point Loop Road).

Alternative A was eliminated from further study because it would require US 17 traffic to travel out of direction and it is not expected Alternative A would improve the traffic carrying capacity and safety of the US 17 and Market Street corridor within the study area. Therefore, Alternative A would not meet the purpose of and need for the proposed project. Alternative A was not shown at the April 2007 citizens informational workshops.

### **Alternative B**

Alternative B begins in New Hanover County at the I-40 interchange with Holly Shelter Road. It has the same alignment as Alternative A from I-40 to NC 210.

From NC 210, Alternative B extends east across several minor roads through undeveloped forested areas. Alternative B continues northeast, crossing Hoover Road north of South Topsail Elementary School. The alternative continues to a proposed interchange with US 17 near Long Leaf Drive, and then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative B was eliminated from further study because it would require US 17 traffic to travel out of direction and it is not expected Alternative B would improve the traffic carrying capacity and safety of the US 17 and Market Street corridor within the study area. Therefore, Alternative B would not meet the purpose of and need for the proposed project. Alternative B was not shown at the April 2007 citizens informational workshops.

### **Alternative C**

Alternative C begins in New Hanover County at the I-40 interchange with Holly Shelter Road. It has the same alignment as Alternatives A and B from I-40 to NC 210.

From NC 210, Alternative C extends northeast across several minor roads through undeveloped forested areas. Alternative C crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative C turns east, and then continues across undeveloped land to a proposed interchange with US 17 near Grandview Drive. Alternative C extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative C was eliminated from further study because it would require US 17 traffic to travel out of direction and it is not expected Alternative C would improve the traffic carrying capacity and safety of the US 17 and Market Street corridor within the study area. Therefore, Alternative C would not meet the purpose of and need for the proposed project. Alternative C was not shown at the April 2007 citizens informational workshops.

Table 2-1. Comparison of Preliminary Corridor Alternatives

Preliminary Corridor Alternatives																									
Alternative	A	B	C	D	E	F	G	H	I	J	K	L	N	O	P	Q	R	S	T	U	V	W	M1	M2	Z
Segment West of NC 210																									
Segment East of NC 210																									
FEATURE	Preliminary Build Alternative impacts are reported below based on the type of information and level of detail available at the point in the project development process the alternative was either dropped from further consideration or carried forward for detailed study.																								
Length (miles)	15.75	15.19	15.65	14.79	14.18	14.59	14.85	14.24	14.65	13.80	13.23	13.69	13.62	13.01	13.42	14.20	13.59	14.00	10.61	10.65	12.51	12.55	3.38	3.47	17.34
Wetland Impacts (acres) <sup>1</sup>	304.1	261.2	218.3	427.9	368.5	330.3	459.4	400.1	361.9	386.9	343.9	301.0	465.9	406.5	368.2	440.6	381.2	342.9	157.7	221.2	438.0	501.5	135.8	146.5	40.7
Stream Impacts: <i>No. Crossings</i> <sup>1</sup> / Linear Feet	<i>9</i> *	<i>7</i> *	<i>10</i> *	5,688	6,130	7,754	5,894	6,335	7,960	<i>9</i> *	<i>7</i> *	<i>10</i> *	10,166	10,608	12,232	6,145	6,586	8,211	2,261	643	8,849	7,232	2,299	2,233	1,331
Residential Displacements <sup>1</sup>	34	46	67	30	40	64	29	39	63	18	30	51	31	41	65	39	49	73	79	53	89	63	86	86	5
Business Displacements <sup>1</sup>	17	18	21	17	20	29	16	19	28	18	19	22	15	18	27	14	17	26	41	34	40	33	29	29	31
Federal/State Threatened and Endangered Species Occurrences	Y	Y	Y	0	0	0	0	0	0	Y	Y	Y	0	0	0	1	1	1	Y	1	Y	Y	0	0	1
RCW Occurrences within 0.5 mile (no. of those occurrences in Holly Shelter Game Land)				8(2)	8(2)	2(2)	8(2)	8(2)	2(2)				9(2)	9(2)	3(2)	8(2)	8(2)	2(2)		8(2)			0	0	2(2)
Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)	Y	Y	N	69.42	43.07	6.78	69.42	43.07	6.78	Y	Y	Y	89.42	63.07	26.78	69.42	43.07	6.78	N	36.29	Y	Y	0	0	0
100 Year Floodplain Impacts (acres) <sup>1</sup>	61.63	55.26	37.29	41.50	46.27	35.79	51.94	56.71	46.23	40.25	33.88	15.91	33.84	38.61	28.13	34.40	39.17	28.69	22.22	42.68	22.22	42.68	0	0	0
Recorded Historic Properties <sup>2</sup>	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	0	3	3	0	0	0
Recorded Archaeological Sites <sup>2</sup>	23	29	36	0	0	0	0	0	0	26	32	39	0	0	0	0	0	0	47	1	35	29	0	0	0
Wildlife Refuge/Game Lands <sup>1</sup>	N	N	N	0	0	0	0	0	0	N	N	N	0	0	0	0	0	0	N	0	N	N	0	0	0
Recreational Areas/Parks <sup>1</sup>	N	N	N	0	0	0	0	0	0	N	N	N	0	0	0	0	0	0	N	0	N	N	1	1	0
Acres in High Quality Waters (HQW, ORW, WS Protected or Critical Areas)	Y	Y	Y	0	0	8.92	0	0	8.92	Y	Y	Y	0	0	8.92	0	0	8.92	Y	29.29	Y	Y	1.31	1.31	38.6
Cemeteries <sup>1</sup>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	1	2	2	3
Potential Underground Storage Tank/Hazmat Sites	60	59	64	0	0	0	0	0	0	14	15	18	0	0	0	0	0	0	19	3	18	17	19	19	140

Notes: Impact calculations are based on preliminary corridor alignments: <sup>1</sup>Within 300-foot corridor on new location alternatives and within 150-foot corridor along existing US 17; <sup>2</sup>Within one mile of corridor centerline.

\*Includes streams and ponds.





## **Alternative D**

Alternative D begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative extends northeast across SR 1572 (Sidbury Road). Alternative D extends into Pender County, crossing a transmission line easement near Churchhouse Bay Lane. Alternative D includes a proposed interchange at NC 210 southeast of the NC 210 and Island Creek Road intersection.

From its interchange at NC 210, Alternative D continues to the northeast, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative D extends through forested land, crosses Saps Road and Hoover Road, and turns east. Alternative D extends to the north of Castle Bay, an existing residential golf course community off of Hoover Road, and ties into existing US 17 near Long Leaf Drive with a proposed interchange. Alternative D then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road. Alternative D was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives D and G were combined following the workshops. The resultant alternative, Alternative D-G, was selected to be studied in detail.

## **Alternative E**

Alternative E begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative follows the same alignment as Alternative D from the Wilmington Bypass to NC 210.

From its interchange at NC 210, Alternative E extends east and crosses Hoover Road north of South Topsail Elementary School. The alternative continues northeast and ties into existing US 17 at a proposed interchange near Long Leaf Drive. Alternative E then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative E was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives E and H were combined following the workshops. The resultant alternative, Alternative E-H, was selected to be studied in detail.

## **Alternative F**

Alternative F begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative follows the same alignment as Alternatives D and E from the Wilmington Bypass to NC 210.

From its interchange at NC 210, Alternative F extends east across several minor roads and crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative F turns south and ties into existing US 17 with an interchange near

Grandview Drive south of the Topsail Schools complex. Alternative F then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative F was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives F and I were combined following the workshops. The resultant alternative, Alternative F-I, was selected to be studied in detail.

### **Alternative G**

Alternative G begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative travels northeast across Sidbury Road. Alternative G continues north and turns east to parallel the south side of the transmission line easement as it enters Pender County. After crossing into Pender County, Alternative G continues northeast to a proposed interchange with NC 210.

From the interchange at NC 210, Alternative G continues to the northeast, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative G extends through forested land, crosses Saps Road and Hoover Road, and turns east. Alternative G extends to the north of Castle Bay and ties into existing US 17 near Long Leaf Drive with a proposed interchange. Alternative G then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative G was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives D and G were combined following the workshops. The resultant alternative, Alternative D-G, was selected to be studied in detail.

### **Alternative H**

Alternative H begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative follows the same alignment as Alternative G between the Wilmington Bypass and NC 210.

From its interchange at NC 210, Alternative H extends east across several minor roads and crosses Hoover Road north of South Topsail Elementary School. The alternative continues northeast and ties into existing US 17 at a proposed interchange near Long Leaf Drive. Alternative H then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative H was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives E and H were combined following the workshops. The resultant alternative, Alternative E-H, was selected to be studied in detail.

## **Alternative I**

Alternative I begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative follows the same alignment as Alternatives G and H between the Wilmington Bypass and NC 210.

From its interchange at NC 210, Alternative I extends east across several minor roads and crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative I turns south and ties into existing US 17 with an interchange near Grandview Drive south of the Topsail Schools complex. Alternative I then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative I was shown at the April 2007 citizens informational workshops. Because of their close proximity, the study corridors for Alternatives F and I were combined following the workshops. The resultant alternative, Alternative F-I, was selected to be studied in detail.

## **Alternative J**

Alternative J begins in New Hanover County at the US 17 Wilmington Bypass interchange with Market Street. It extends north across undeveloped property, crossing Sidbury Road near the New Hanover County/Pender County line. Alternative J continues northeast, crossing Harrison Creek Road, to a proposed interchange at NC 210.

From the interchange at NC 210, Alternative J continues to the northeast, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative J extends through forested land, crosses Saps Road and Hoover Road, and turns east. Alternative J extends to the north of Castle Bay and ties into existing US 17 near Long Leaf Drive with an interchange. Alternative J then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative J was eliminated from further study due to constructability issues. This alternative would result in the US 17 Wilmington Bypass, Market Street, and Hampstead Bypass traffic converging at one location, with one facility being full control of access and the other two facilities being partial to no control of access. From a design standpoint, it would not be feasible to separate traffic while maintaining a travel corridor along existing US 17. Alternative J was not shown at the April 2007 citizens informational workshops.

## **Alternative K**

Alternative K begins in New Hanover County at the US 17 Wilmington Bypass interchange with Market Street. The alternative follows the same alignment as Alternative J from the Wilmington Bypass to NC 210.

From NC 210, Alternative K extends east across several minor roads and crosses Hoover Road north of South Topsail Elementary School. The alternative continues northeast through undeveloped property to a proposed interchange with US 17 north of the Topsail Schools complex near Long Leaf Drive. Alternative K then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative K was eliminated from further study due to constructability issues. This alternative would result in the US 17 Wilmington Bypass, Market Street, and Hampstead Bypass traffic converging at one location, with one facility being full control of access and the other two facilities being partial to no control of access. From a design standpoint, it would not be feasible to separate traffic while maintaining a travel corridor along existing US 17. Alternative K was not shown at the April 2007 citizens informational workshops.

### **Alternative L**

Alternative L begins in New Hanover County at the US 17 Wilmington Bypass interchange with Market Street. The alternative follows the same alignment as Alternatives J and K from the Wilmington Bypass to NC 210.

From its interchange at NC 210, Alternative L extends east across several minor roads and crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative L turns south and ties into existing US 17 with an interchange near Grandview Drive south of the Topsail Schools complex. Alternative L then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative L was eliminated from further study due to constructability issues. This alternative would result in the US 17 Wilmington Bypass, Market Street, and Hampstead Bypass traffic converging at one location, with one facility being full control of access and the other two facilities being partial to no control of access. From a design standpoint, it would not be feasible to separate traffic while maintaining a travel corridor along existing US 17. Alternative L was not shown at the April 2007 citizens informational workshops.

### **Alternative N**

Alternative N begins in New Hanover County at the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. It extends northeast from the bypass through undeveloped land and crosses Sidbury Road near the New Hanover County/Pender County line. The alternative continues northeast across Harrison Creek Road to a proposed interchange at NC 210.

From the interchange at NC 210, Alternative N continues to the northeast, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative N extends through forested land, crosses Saps Road and Hoover Road, and turns east. Alternative N extends to the north of Castle Bay and ties into existing US 17 near Long Leaf Drive with a proposed interchange. Alternative N then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative N was shown at the April 2007 citizens informational workshops. Alternative N was selected to be studied in detail following the workshops.

### **Alternative O**

Alternative O begins in New Hanover County at the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. The alternative follows the same alignment as Alternative N from the Wilmington Bypass to NC 210.

From its interchange at NC 210, Alternative O extends northeast across several minor roads and crosses Hoover Road north of South Topsail Elementary School. The alternative continues northeast to a proposed interchange with existing US 17 near Long Leaf Drive. Alternative O then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative O was shown at the April 2007 citizens informational workshops. Alternative O was selected to be studied in detail following the workshops.

### **Alternative P**

Alternative P begins in New Hanover County at the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. The alternative follows the same alignment as Alternatives N and O from the Wilmington Bypass to NC 210.

From its interchange at NC 210, Alternative P extends northeast across several minor roads and crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative P turns east and ties into existing US 17 with a proposed interchange near Grandview Drive south of the Topsail Schools complex. Alternative P then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative P was shown at the April 2007 citizens informational workshops. Alternative P was selected to be studied in detail following the workshops.

### **Alternative Q**

Alternative Q begins in New Hanover County at an interchange with the US 17 Wilmington Bypass approximately midway between I-40 and Market Street. Alternative Q extends northeast from the bypass and crosses Sidbury Road near the New Hanover County/Pender County line. The alternative continues northeast across Harrison Creek Road to a proposed interchange with NC 210.

From the interchange at NC 210, Alternative Q continues to the northeast, crossing a large power line easement near Godfrey Creek Road. North of Godfrey Creek Road, Alternative Q extends through forested land, crosses Saps Road and Hoover Road, and turns east. Alternative Q extends to the north of Castle Bay and ties into existing US 17 near Long Leaf Drive with a proposed interchange. Alternative Q then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative Q was shown at the April 2007 citizens informational workshops. Alternative Q was selected to be studied in detail following the workshops.

### **Alternative R**

Alternative R begins in New Hanover County at an interchange with the US 17 Wilmington Bypass approximately midway between the existing interchanges with I-40 and Market Street. Alternative R extends northeast from the bypass and crosses Sidbury Road near the New Hanover County/Pender County line. The alternative continues northeast across Harrison Creek Road to a proposed interchange with NC 210.

From its interchange at NC 210, Alternative R extends northeast across several minor roads and crosses Hoover Road north of South Topsail Elementary School. The alternative continues northeast to a proposed interchange with existing US 17 near Long Leaf Drive. Alternative R then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative R was shown at the April 2007 citizens informational workshops. Alternative R was selected to be studied in detail following the workshops.

### **Alternative S**

Alternative S begins in New Hanover County at an interchange with the US 17 Wilmington Bypass approximately midway between the existing interchanges with I-40 and Market Street. Alternative S extends northeast from the bypass and crosses Sidbury Road near the New Hanover County/Pender County line. The alternative continues northeast across Harrison Creek Road to a proposed interchange with NC 210.

From its interchange at NC 210, Alternative S extends northeast across several minor roads and crosses Hoover Road north of South Topsail Elementary School. At Hoover Road, Alternative S turns east and ties into existing US 17 with a proposed interchange near Grandview Drive south of the Topsail Schools complex. Alternative S then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative S was shown at the April 2007 citizens informational workshops. Alternative S was selected to be studied in detail following the workshops.

### **Alternative T**

Alternative T begins in New Hanover County at the existing US 17 Wilmington Bypass and Market Street interchange. The alternative extends along existing US 17 to a proposed interchange approximately two miles north of the New Hanover County line, where it transitions to new location. Alternative T intersects with NC 210 at an interchange approximately 0.5 mile west of existing US 17. From its interchange at NC 210, Alternative T curves northeast, connecting with existing US 17 at a proposed interchange near Grandview Drive south of the Topsail Schools complex. Alternative T then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative T was shown at the April 2007 citizens informational workshops. Alternative T was eliminated from further study following the workshops because compared to some alternatives it would cause a higher number of residential and business displacements and would likely impact several historic and archaeological sites.

### **Alternative U**

Alternative U begins in New Hanover County at a proposed interchange with the US 17 Wilmington Bypass. The interchange location will vary depending on the selected preferred Military Cutoff Road Extension alternative (M1 or M2). Alternative U extends along existing US 17 to a proposed interchange approximately two miles north of the New Hanover County line, where it transitions to new location. Alternative U intersects with NC 210 at an interchange approximately 0.5 mile west of existing US 17. From its interchange at NC 210, Alternative U continues northeast parallel to existing US 17 and crosses Hoover Road south of South Topsail Elementary School. The corridor continues northeast to a proposed interchange with existing US 17 near Long Leaf Drive. Alternative U then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative U was shown at the April 2007 citizens informational workshops. Alternative U was selected to be studied in detail following the workshops.

### **Alternative V**

Alternative V begins in New Hanover County at the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. Alternative V intersects with NC 210 at a proposed interchange approximately 0.5 mile west of existing US 17. From its interchange at NC 210, Alternative V curves northeast, connecting with existing US 17 at a proposed interchange near Grandview Drive south of the Topsail Schools complex. Alternative V then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative V was shown at the April 2007 citizens informational workshops. Alternative V was eliminated from further study following the workshops because compared to some alternatives it would cause a higher number of residential and business displacements, would impact more exceptionally significant wetlands and streams, and would likely impact several historic and archaeological sites.

### **Alternative W**

Alternative W begins in New Hanover County at the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. Alternative W travels northeast to intersect with NC 210 at a proposed interchange approximately 0.5 mile west of existing US 17. From its interchange at NC 210, Alternative W continues northeast parallel to existing US 17 and crosses Hoover Road south of South Topsail Elementary School. The alternative continues northeast to a proposed interchange with existing US 17 near Long Leaf Drive. Alternative W then extends along existing US 17 to end at a signalized intersection at Sloop Point Loop Road.

Alternative W was shown at the April 2007 citizens informational workshops. Alternative W was eliminated from further study following the workshops because compared to some alternatives it would cause a higher number of residential and business displacements, would impact more exceptionally significant wetlands and streams, and would likely impact several historic and archaeological sites.

### **Alternative Z (Improve Existing Alternative)**

Alternative Z is the “Improve Existing” alternative. This alternative adds lanes to Market Street and existing US 17 from College Road in New Hanover County to Sloop Point Loop Road in Pender County. Access to properties along existing US 17 is provided by service roads and interchanges at: realigned Sidbury Road and SR 1571 (Scotts Hill Loop Road); realigned NC 210 (approximately 0.5 mile south of existing NC 210); and approximately 0.25 mile south of the Topsail Schools complex.

Alternative Z was shown at the April 2007 citizens informational workshops. Alternative Z was selected to be studied in detail following the workshops.

## **2.2.4.2 MILITARY CUTOFF ROAD EXTENSION PRELIMINARY BUILD ALTERNATIVES**

Military Cutoff Road Extension Alternatives M1 and M2 are new location alternatives extending Military Cutoff Road from Market Street to the US 17 Wilmington Bypass.

### **Alternative M1**

Alternative M1 begins at a proposed interchange at Military Cutoff Road and Market Street. The alternative extends north through vacant County property between the two sections of Ogden Park and residential areas. Alternative M1 then turns northwest and ends near Plantation Road and Crooked Pine Road at a proposed interchange with the US 17 Wilmington Bypass, approximately midway between the I-40 and Market Street interchanges.

The City of Wilmington adopted a transportation corridor official map for the proposed extension of Military Cutoff Road on August 8, 2005 (see Figures 7A and 7B). Alternative M1 follows the adopted corridor map alignment.

Alternative M1 was shown at the April 2007 citizens informational workshops. Alternative M1 was selected to be studied in detail following the workshops.

### **Alternative M2**

Alternative M2 begins at a proposed interchange at Military Cutoff Road and Market Street. From the proposed interchange, Alternative M2 follows the same alignment as Alternative M1 for approximately two miles. Alternative M2 then turns northeast and extends through mostly undeveloped property to a proposed interchange with the US 17 Wilmington Bypass, approximately one mile west of Market Street.



Alternative M2 was shown at the April 2007 citizens informational workshops. Alternative M2 was selected to be studied in detail following the workshops.

## **2.3 AUGUST 2007 DETAILED STUDY ALTERNATIVES**

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As discussed above, following the April 2007 citizens informational workshops, two new location detailed study alternatives were selected for Military Cutoff Road Extension (U-4751), and ten new location and one improve existing detailed study alternatives were selected for Hampstead Bypass (R-3300) in August 2007. A total of 13 detailed study alternatives for the overall project were created by combining the individual alternatives for the Military Cutoff Road Extension and the Hampstead Bypass sections of the proposed project. The 13 detailed study alternatives selected in August 2007 for the overall project are shown on Figure 8 and a comparison of the alternatives is shown in Table 2-2.

All of the alternatives for the project will affect foraging habitat for red-cockaded woodpecker (RCW), a federally-listed endangered species (see Sections 3.5.4.3 and 4.5.4.3). Because of this, the August 2007 detailed study alternatives were evaluated for ways to minimize impacts to RCW foraging habitat.

Minimization options were developed and adopted for Hampstead Bypass 2007 Detailed Study Alternatives E-H, O, R, and U. Impacts to RCW foraging habitat were minimized for these alternatives by shifting the proposed interchange with existing US 17 near Long Leaf Drive to the south. The minimization option instead includes a proposed interchange approximately 0.7 mile west of Grandview Drive, south of the Topsail Schools complex. Existing US 17 will be realigned to the west to connect with the Hampstead Bypass at this interchange. With the minimization option, the Hampstead Bypass would tie into existing US 17 near Leeward Lane, and the section of existing US 17 between Grandview Drive and Leeward Lane would function as a service road.

The August 2007 detailed study alternatives eliminated from further consideration following detailed environmental surveys are discussed in the following sections. The alignment of the corridors for Hampstead Bypass 2007 Detailed Study Alternatives D-G, F-I, N, P, Q, S, and Z precluded the development of an option that would substantially minimize impacts to RCW foraging habitat. These alternatives were eliminated from further consideration due to their impacts to RCW foraging habitat, as well as to other resources. The detailed study alternatives that were retained for further study in the DEIS are presented in Section 2.4.

### **2.3.1 HAMPSTEAD BYPASS AUGUST 2007 DETAILED STUDY ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION**

#### **Alternative D-G** (Combination of preliminary build alternatives D and G)

Alternative D-G extends from a proposed interchange with the US 17 Wilmington Bypass approximately midway between I-40 and Market Street to existing US 17 at Sloop Point Loop Road. Alternative D-G was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including future potentially suitable and potentially suitable RCW habitat, streams, managed natural areas, forested areas, and floodplains.

#### **Alternative F-I** (Combination of preliminary build alternatives F and I)

Alternative F-I extends from a proposed interchange with the US 17 Wilmington Bypass approximately midway between I-40 and Market Street to existing US 17 at Sloop Point Loop Road. Alternative F-I was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including streams, ponds, residential and business displacements, and future potentially suitable and potentially suitable RCW habitat.

#### **Alternative N**

Alternative N extends from a proposed interchange with the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange to existing US 17 at Sloop Point Loop Road. Alternative N was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including wetlands, managed natural areas, forested areas, and future potentially suitable and potentially suitable RCW habitat.

#### **Alternative P**

Alternative P extends from a proposed interchange with the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange to existing US 17 at Sloop Point Loop Road. Alternative P was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including streams, wetlands, ponds, residential and business displacements, and future potentially suitable and potentially suitable RCW habitat.

#### **Alternative Q**

Alternative Q extends from a proposed interchange with the US 17 Wilmington Bypass approximately midway between I-40 and Market Street to existing US 17 at Sloop Point Loop Road. Alternative Q was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including streams and future potentially suitable and potentially suitable RCW habitat.

Table 2-2. Comparison of August 2007 Detailed Study Alternatives

August 2007 Detailed Study Alternatives													
Alternative	M1+D-G	M1+E-H*	M1+F-I	M2+N	M2+O*	M2+P	M1+Q	M1+R*	M1+S	M1+U*	M2+U *	M1+Z	M2+Z
Military Cutoff Road Ext. Segment													
Segment West of NC 210													
Segment East of NC 210		--●---			--●---			--●---		--●---			
FEATURE <sup>1</sup>	Detailed study alternative impacts are reported below based on the type of information and level of detail available at the point in the project development process the alternative was either dropped from further consideration or carried forward for detailed study.												
Length (miles)	18.22	17.51	17.82	17.21	16.56	16.88	17.77	17.09	17.43	18.01	16.80	21.26	21.21
Delineated Wetland Impacts (acres)	265.7	223.4	213.8	402.9	360.6	350.9	315.7	273.4	263.8	205.4	265.1	146.5	206.2
Delineated Stream Impacts (linear feet)	27,930	23,383	26,358	16,923	12,376	15,351	27,644	23,096	26,021	14,995	8,343	21,399	14,747
Delineated Pond Impacts (acres)	1.69	2.92	4.39	2.11	3.34	4.81	1.97	3.20	4.67	2.77	2.77	3.25	3.25
Residential Displacements	25	31	90	25	31	90	26	32	91	72	71	145	144
Business Displacements	37	33	69	37	33	69	37	33	69	42	42	269	269
Red-cockaded Woodpecker Future Potentially Suitable/Potentially Suitable Habitat (acres)	52.87/1.01	6.94/0.28	17.35/2.89	52.87/1.01	6.94/0.28	17.35/2.89	52.87/1.01	6.94/0.28	17.35/2.89	6.94/0.28	6.94/0.28	19.97/3.46	19.97/3.46
Other Surveyed Federal/State Threatened and Endangered Species Habitat Present	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)	18.27	4.43	4.42	56.78	42.93	42.93	18.85	5.00	5.00	3.23	34.37	3.23	34.37
Prime and Unique Farmland Soils (acres)	700.23	700.41	767.06	696.31	696.43	762.77	666.56	666.54	732.92	479.56	500.17	690.98	711.52
Forest (acres)	544.69	493.49	467.35	537.96	486.74	460.46	497.93	446.70	420.43	376.71	424.61	263.22	311.85
100 Year Floodplain and Floodway Crossings (no.)/(acres)	4/12.65	3/10.50	3/10.83	3/7.85	2/5.70	2/6.03	3/7.85	2/5.70	2/6.03	1/1.94	1/1.94	0/0.10	0/0.10
Recorded Historic Properties (no.)	0	0	0	0	0	0	0	0	0	1	1	1	1
Recorded Archaeological Sites (no.)	0	0	0	0	0	0	0	0	0	1	1	2	2
Wildlife Refuge/Game Lands (acres)	0.03	0	0	0.03	0	0	0.03	0	0	0	0	1.55	1.55
Recreational Areas/Parks (no.)	0	0	0	0	0	0	0	0	0	0	0	1	1
High Quality Waters (HQW, ORW, WS Protected or Critical Areas) (acres)	4.48	7.02	28.11	4.48	7.02	28.11	4.48	7.02	28.11	9.68	9.68	121.36	121.36
Cemeteries (no.)	3	3	4	3	3	4	3	3	4	5	5	9	9
Potential UST/Hazmat Sites (no.)	6	5	8	6	5	8	6	5	8	5	5	36	36

Notes: \*Red-cockaded woodpecker minimization design option. Impacts based on concept sketches.

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet.



## **Alternative S**

Alternative S extends from a proposed interchange with the US 17 Wilmington Bypass approximately midway between I-40 and Market Street to existing US 17 at Sloop Point Loop Road. Alternative S was eliminated from further study following detailed environmental surveys because it would have greater impacts than several other alternatives to a number of resources, including streams, ponds, residential and business displacements, and future potentially suitable and potentially suitable RCW habitat.

## **Alternative Z (Improve Existing Alternative)**

Alternative Z widens the existing Market Street/US 17 corridor. Alternative Z was eliminated from further study following detailed environmental surveys because it would have greater impacts on homes and businesses than any of the other alternatives. Alternative Z would also have greater impacts than several other alternatives to a number of other resources, including future potentially suitable and potentially suitable RCW habitat and High Quality Waters.

### **2.3.2 MILITARY CUTOFF ROAD EXTENSION AUGUST 2007 DETAILED STUDY ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION**

Both of the August 2007 detailed study alternatives for the proposed Military Cutoff Road Extension (Alternatives M1 and M2) were retained for further study in the DEIS. These alternatives are described in Section 2.4.1.2.

## **2.4 DEIS DETAILED STUDY ALTERNATIVES**

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Four new location build alternatives for the Hampstead Bypass (R-3300) and two new location build alternatives for Military Cutoff Road Extension (U-4751) were retained for further study in the DEIS. The DEIS detailed study alternatives for Hampstead Bypass are E-H, O, R, and U (see Section 2.4.2). The DEIS detailed study alternatives for Military Cutoff Road Extension are M1 and M2 (see Section 2.4.2). A total of five DEIS detailed study alternatives for the overall project were created by combining the individual alternatives for the Hampstead Bypass and the Military Cutoff Road Extension sections of the proposed project: M1+E-H, M2+O, M1+R, M1+U, and M2+U. A comparison of the anticipated impacts for the five DEIS detailed study alternatives for the overall project is included in Table 2-3, and the alternatives are shown on Figure 9 and Figures 10A through 10K.

As discussed in Section 2.8, design changes occurred to the preferred alternative (Alternative M1+E-H) following its selection. Alternative M1+E-H is described below as it was proposed prior to its selection as the preferred alternative.

Table 2-3. Comparison of DEIS Detailed Study Alternatives

<b>DEIS Detailed Study Alternatives</b>					
Alternative	<b>M1+E-H</b>	<b>M2+O</b>	<b>M1+R</b>	<b>M1+U</b>	<b>M2+U</b>
Military Cutoff Road Ext. Segment					
Segment West of NC 210					
Segment East of NC 210					
<b>FEATURE<sup>1</sup></b>					
<b>Length (miles)</b>	17.5	16.6	17.1	18.0	16.8
<b>Delineated Wetland Impacts (acres)</b>	246.05	384.42	297.24	218.35	283.77
<b>Delineated Stream Impacts (linear feet)</b>	24,531	13,842	24,571	15,450	8,786
<b>Delineated Pond Impacts (acres)</b>	3.90	4.32	4.18	3.68	3.68
<b>Residential Displacements</b>	61	60	59	93	95
<b>Business Displacements<sup>2</sup></b>	84	84	84	106	106
<b>Red-cockaded Woodpecker Future Potentially Suitable/Potentially Suitable Habitat (acres)</b>	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39
<b>Other Surveyed Federal/State Threatened and Endangered Species Habitat Present</b>	Yes	Yes	Yes	Yes	Yes
<b>Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)</b>	4.43	42.94	5.01	3.24	34.40
<b>Prime and Unique Farmland Soils (acres)</b>	68	58	58	50	50
<b>Forest (acres)<sup>3</sup></b>	512.12	506.24	466.45	405.65	454.80
<b>100 Year Floodplain and Floodway Impacts (acres)</b>	11.73	8.8	8.8	3.0	3.0
<b>Historic Properties (no.)</b>	1	1	1	4	4
<b>Noise Receptor Impacts</b>	257	236	248	310	304
<b>Recorded Archaeological Sites (no.)</b>	0	0	0	1	1
<b>Wildlife Refuge/Game Lands (acres)</b>	0	0	0	0	0
<b>Recreational Areas/Parks (no.)</b>	0	0	0	0	0
<b>High Quality Waters (HQW, ORW, WS Protected or Critical Areas) (acres)</b>	9.6	9.6	9.6	12.4	12.4
<b>Cemeteries (no.)</b>	2	2	2	5	5
<b>Potential UST/Hazmat Sites (no.)</b>	5	5	5	5	5

Impacts presented are based on the design of the alternatives at the time of the selection of the preferred alternative. Table 2-12 presents a comparison of the DEIS detailed study alternatives (except M2+O and M2+U), applying the design changes made to Alternative M1+E-H since its selection to the other alternatives.

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet.

<sup>2</sup>Includes non-profit displacements.

<sup>3</sup>These numbers are corrections to the information included in the DEIS. The DEIS incorrectly reported the forest impacts for the detailed study alternatives.

## **2.4.1 DESCRIPTION OF DEIS DETAILED STUDY ALTERNATIVES**

### **2.4.1.1 HAMPSTEAD BYPASS DEIS DETAILED STUDY ALTERNATIVES**

#### **Alternative E-H (Preferred Alternative)**

Alternative E-H begins in New Hanover County at a proposed interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. The alternative extends northwest past Sidbury Road into Pender County. Land use between the bypass and Sidbury Road is mostly undeveloped property. Alternative E-H turns to the northeast and continues to a proposed interchange with NC 210 east of Island Creek Road.

From its interchange at NC 210, Alternative E-H extends northeast across several minor roads that include lightly developed residential areas and through undeveloped forested areas. Alternative E-H crosses Hoover Road north of South Topsail Elementary School and continues northeast through undeveloped property to a proposed interchange with realigned US 17 approximately 0.7 mile west of Grandview Drive. Alternative E-H continues north behind the Topsail Schools complex and then turns east to tie into existing US 17 near Leeward Lane. Alternative E-H continues north on existing US 17 to Sloop Point Loop Road.

As discussed in Section 2.7, Alternative E-H was selected as the preferred alternative for the proposed US 17 Hampstead Bypass following the October 2011 corridor public hearings. The Wilmington Metropolitan Planning Organization adopted a transportation corridor official map for Hampstead Bypass (2011). Alternative E-H generally follows the adopted corridor map alignment (see Figures 7C and 7D). The detailed transportation corridor official map for Hampstead Bypass can be viewed online at [www.wmpo.org/projects.html](http://www.wmpo.org/projects.html).

#### **Alternative O**

Alternative O begins in New Hanover County at a proposed interchange with the US 17 Wilmington Bypass approximately one mile west of the Market Street interchange. It extends north from the bypass through undeveloped land and crosses Sidbury Road at the New Hanover County/Pender County line. The alternative continues north through predominantly undeveloped land to a proposed interchange at NC 210.

From its interchange at NC 210, Alternative O extends northeast across several minor roads that include lightly developed residential areas and through undeveloped forested areas. It continues through farmland, crosses Hoover Road north of South Topsail Elementary School, and continues northeast through undeveloped property to a proposed interchange with realigned US 17 approximately 0.7 mile west of Grandview Drive. Alternative O continues north behind the Topsail Schools complex and then

turns east to tie into existing US 17 near Leeward Lane. Alternative O continues north on existing US 17 to Sloop Point Loop Road.

### **Alternative R**

Alternative R begins in New Hanover County at an interchange with the US 17 Wilmington Bypass, approximately midway between I-40 and Market Street. Alternative R extends northeast from the bypass across undeveloped land and crosses Sidbury Road at the New Hanover County/Pender County line. The alternative continues north through predominantly undeveloped land to an interchange at NC 210.

From its interchange at NC 210, Alternative R crosses Hoover Road north of South Topsail Elementary School and continues northeast through undeveloped property to a proposed interchange with realigned US 17 approximately 0.7 mile west of Grandview Drive. Alternative R continues north behind the Topsail Schools complex and then turns east to tie into existing US 17 near Leeward Lane. Alternative R continues north on existing US 17 to Sloop Point Loop Road.

### **Alternative U**

Alternative U begins in New Hanover County at a proposed interchange with the US 17 Wilmington Bypass. The interchange location will vary depending on the selected preferred Military Cutoff Road Extension alternative (M1 or M2). Alternative U follows the Wilmington Bypass through the existing interchange at Market Street. The alternative runs along existing US 17 to a proposed interchange with realigned Sidbury Road. Alternative U continues north on existing US 17 for approximately two miles to where it transitions to new location at a proposed interchange with existing US 17. Alternative U continues north on new location to intersect with NC 210 at a proposed interchange approximately 0.5 mile west of existing US 17.

From its interchange at NC 210, Alternative U continues north parallel to existing US 17 and crosses Hoover Road south of South Topsail Elementary School. The alternative continues northeast through undeveloped property to a proposed interchange with realigned US 17 approximately 0.5 mile west of Grandview Drive. Alternative U continues north behind the Topsail Schools complex and then turns east to tie into existing US 17 near Leeward Lane. Alternative U continues north on existing US 17 to Sloop Point Loop Road.

## **2.4.1.2 MILITARY CUTOFF ROAD EXTENSION DEIS DETAILED STUDY ALTERNATIVES**

Military Cutoff Road Extension Alternatives M1 and M2 are new location alternatives extending Military Cutoff Road from Market Street to the US 17 Wilmington Bypass.

### **Alternative M1 (Preferred Alternative)**

Alternative M1 begins at a proposed interchange at Military Cutoff Road and Market Street. The alternative extends north through vacant County property between the two



sections of Ogden Park and residential areas. Alternative M1 then turns northwest and ends near Plantation Road and Crooked Pine Road at a proposed interchange with the US 17 Wilmington Bypass, approximately midway between the I-40 and Market Street interchanges. The City of Wilmington adopted a transportation corridor official map for the proposed extension of Military Cutoff Road on August 8, 2005 (see Figures 7A and 7B). Alternative M1 generally follows the adopted corridor map alignment. The map was amended in October 2011 to include a larger area in the vicinity of the proposed Market Street and Military Cutoff Road Extension interchange. The revised map sheets can be viewed online at <http://pdf.time1.net/military-cutoff-and-market-street-proposed-interchange-revised-download-w1327/>.

As discussed in Section 2.7, Alternative M1 was selected as the preferred alternative for the proposed Military Cutoff Road Extension following the October 2011 corridor public hearings.

### **Alternative M2**

Alternative M2 begins at a proposed interchange at Military Cutoff Road and Market Street. From the proposed interchange, Alternative M2 follows the same alignment as Alternative M1 for approximately two miles. Alternative M2 then turns northeast and extends through mostly undeveloped property to a proposed interchange with the US 17 Wilmington Bypass, approximately one mile west of Market Street.

## **2.4.2 DEIS DETAILED STUDY ALTERNATIVES DESIGN CRITERIA**

The design criteria used to develop preliminary designs for the DEIS detailed study alternatives are based on the project's location, function, and classification. The design criteria conform to the standards established by the American Association of State Highway and Transportation Officials (AASHTO).

### **2.4.2.1 DESIGN SPEED**

A 70 mph design speed (65 mph posted speed limit) is proposed for Hampstead Bypass. A 50 mph design speed (45 mph posted speed limit) is proposed for Military Cutoff Road Extension.

### **2.4.2.2 TYPICAL SECTIONS**

The typical sections used for the proposed Hampstead Bypass and Military Cutoff Road Extension for the DEIS detailed study alternatives are influenced by the type of facility required to fulfill the project's purpose and need. The number of proposed lanes included in the typical sections is based on providing capacity for existing and future traffic. Traffic operations analyses are discussed in detail in Section 2.5. Level of Service (LOS) D is the desirable traffic service for the proposed facilities in the 2035 design year.

As discussed previously, design changes occurred to the preferred alternative (Alternative M1+E-H) following its selection. Alternative M1+E-H is described below as it was proposed prior to its selection as the preferred alternative. Section 2.8 describes the changes that have occurred to Alternative M1+E-H since its selection.

#### **2.4.2.2.1 HAMPSTEAD BYPASS TYPICAL SECTIONS**

Figures 11A and 11B show the proposed typical sections for Hampstead Bypass for the DEIS detailed study alternatives. NCDOT proposes to construct the Hampstead Bypass as a freeway facility. Therefore, no bicycle lanes or sidewalks are proposed.

#### **Alternatives E-H, O, and R**

The proposed typical section for Hampstead Bypass Alternatives E-H, O, and R from the proposed interchange at the US 17 Wilmington Bypass to the proposed interchange at NC 210 consists of six 12-foot lanes (three in each direction) with 14-foot outside shoulders (12-foot paved). A 46-foot median is proposed. From the proposed interchange at NC 210 to existing US 17, the roadway typical section for Alternatives E-H, O, and R is comprised of four 12-foot lanes (two in each direction) with 14-foot outside shoulders (12-foot paved). A 46-foot median is proposed.

The number of proposed lanes along Hampstead Bypass Alternatives E-H, O, and R is based on providing capacity for existing and future traffic. Traffic operations analyses are discussed in detail in Section 2.5. The analyses show that six lanes are required to accommodate future traffic volumes along the proposed bypass from the US 17 Wilmington Bypass to NC 210. Four lanes will accommodate future traffic volumes along the portion of the proposed bypass between NC 210 and the proposed interchange with existing US 17. Traffic volumes along the bypass increase again from the interchange with existing US 17 to the end of the project. However, in order to reduce RCW habitat impacts, only four lanes are proposed along this section of the bypass.

#### **Alternative U**

The proposed typical section for Hampstead Bypass Alternative U from the proposed interchange at the US 17 Wilmington Bypass to the proposed interchange with existing US 17 consists of ten 12-foot lanes (five in each direction) with 14-foot outside shoulders (12-foot paved). A 22-foot median with ten-foot inside shoulders and a two-foot concrete barrier is proposed.

Several considerations factored into the proposed typical section for this segment of Alternative U:

- Year 2035 traffic projections for Alternative U in this area are comparable to traffic found on the busiest roads in the most populated areas in North Carolina, including Charlotte and Raleigh.
- Traffic analyses show that the number of lanes required between the proposed interchange with the US 17 Wilmington Bypass and the proposed interchange at

NC 210 are higher for Alternative U than for Alternatives E-H, O, and R between the same points. This is because Alternatives E-H, O, and R provide northbound travelers the option of either using the proposed Hampstead Bypass or existing US 17, while all traffic is directed along one route with Alternative U. More lanes are required to process this increased traffic on Alternative U.

- US 17 Wilmington Bypass and existing US 17, each with four lanes and poor traffic service, come together along this section of Alternative U. With their combined traffic and an additional 70,000 cars, ten lanes are needed to accommodate projected 2035 traffic volumes.
- As noted above, NCDOT proposes a freeway facility with full control of access for the Hampstead Bypass because in addition to increasing safety, it would provide greater benefit in terms of traffic service than the partial or open control of access options. An expressway, or non-freeway option, with direct access from the bypass to adjacent properties would require 14 travel lanes to provide adequate traffic carrying capacity. The signals required for an expressway reduce the capacity from approximately 2,200 passenger cars per hour for a freeway lane, to approximately 450 vehicles per hour for an expressway lane. In addition, there would be driver expectancy and safety concerns associated with the Hampstead Bypass making the transition from a freeway to a 14-lane expressway with signalization and turning movements, and back to a freeway.
- Where Alternative U travels along existing US 17, a frontage road system is needed in addition to the main travel lanes to provide access to adjacent properties. roads would provide access to businesses, residences, and community facilities along existing US 17 between the existing interchange with US 17 Wilmington Bypass and the proposed interchange with existing US 17 where Hampstead Bypass transitions to new location. Utilizing service roads minimizes impacts by reducing relocations and right-of-way costs.

Table 2-4 compares capacity and anticipated impacts for four-, six-, eight-, and ten-lane typical sections between the existing interchange at US 17 Wilmington Bypass and Market Street to the proposed Hampstead Bypass interchange at existing US 17 south of Hampstead.

From the proposed interchange with existing US 17 to the proposed interchange at NC 210, the roadway typical section for Alternative U is comprised of six 12-foot lanes (three in each direction) with 14-foot outside shoulders (12-foot paved). A 46-foot median is proposed. The proposed typical section for Alternative U from the proposed interchange at NC 210 north to existing US 17 is four 12-foot lanes (two in each direction) with 14-foot outside shoulders (12-foot paved) in each direction with a 46-foot median. Traffic volumes decrease along the proposed four-lane section between NC 210 and the proposed interchange with existing US 17. Traffic volumes along the bypass increase again from the interchange with existing US 17 to the end of the project. However, in order to reduce RCW habitat impacts, only four lanes are proposed along this segment.

Table 2-4. Comparison of Alternative U Typical Sections

	<b>From Existing Interchange at US 17 Wilmington Bypass and Market St. to Proposed Hampstead Bypass Interchange at Sidbury Rd.</b>	<b>From Proposed Hampstead Bypass Interchange at Sidbury Rd. to Proposed Hampstead Bypass Interchange at Existing US 17 (S. of Hampstead)</b>
2035 ADT	117,000	86,100
<b>10-Lane Freeway with a 22-foot median</b>		
Level of Service/Density <sup>1</sup>	D / 28.5	C / 20.0
Wetland (acres)	0.71	1.10
Streams (linear feet)	0	385.87
Relocations	20 homes, 8 businesses, 2 churches	14 homes, 7 businesses, 3 churches
<b>8-Lane Freeway with a 22-foot median</b>		
Level of Service/Density <sup>1</sup>	E / 44.5	D / 26.0
Wetland (acres)	0.71	1.06
Streams (linear feet)	0	359.65
Relocations	19 homes, 8 businesses, 2 churches	14 homes, 7 businesses, 3 churches
<b>6-Lane Freeway with a 22-foot median</b>		
Level of Service/Density <sup>1</sup>	F (*)	E / 43.0
Wetland (acres)	0.71	1.01
Streams (linear feet)	0	333.11
Relocations	16 homes <sup>2</sup> , 8 businesses, 1 church	13 homes, 7 businesses, 3 churches
<b>4-Lane Freeway with a 22-foot median</b>		
Level of Service/Density <sup>1</sup>	F (*)	F (*)
Wetland (acres)	0.71	0.97
Streams (linear feet)	0	305.72
Relocations	14 homes <sup>2</sup> , 8 businesses, 1 church	13 homes, 6 businesses, 3 churches

<sup>1</sup>Density is defined as passenger cars per mile per lane.

<sup>2</sup>It is probable there would be two additional residential relocations with the six-lane and four-lane typical sections because dual lane exits would likely be needed at the US 17 Wilmington Bypass interchange at Market Street.

\*Overall density result is not computed when vehicle speed on freeway is less than 55 mph.

**Notes:**

- Poplar Grove (on National Register) and Wesleyan Chapel United Methodist Church (National Register eligible) are impacted by all typical sections.
- Impacts are calculated based on slope stake limits plus 25 feet.

#### **2.4.2.2.2 MILITARY CUTOFF ROAD EXTENSION TYPICAL SECTIONS**

Figure 12 shows the proposed typical sections for Military Cutoff Road Extension.

##### **Alternatives M1 and M2**

The proposed typical section for Military Cutoff Road Extension Alternatives M1 and M2 from the proposed interchange at Market Street to approximately one mile north of Torchwood Boulevard consists of six lanes (three in each direction) with a 30-foot raised median and curb and gutter. Two 12-foot inside lanes and one 14-foot outside lane (to accommodate bicycles) with two-foot curb and gutter and a ten-foot berm are proposed in each direction. From approximately one mile north of Torchwood Boulevard to the proposed interchange at the US 17 Wilmington Bypass, the proposed typical section for Military Cutoff Road Extension Alternatives M1 and M2 consists of six 12-foot lanes (three in each direction) with 14-foot outside shoulders (12-foot paved). A 46-foot median is proposed.

The median for Military Cutoff Road Extension transitions from a width of 30 feet to 46 feet between Torchwood Boulevard and the proposed interchange at the US 17 Wilmington Bypass because the proposed roadway transitions from a boulevard facility with limited control of access to a freeway facility with full control of access in this area. The design speed of the proposed roadway also transitions from 50 mph (45 mph posted speed limit) to 70 mph in this area. The 46-foot median is necessary adjacent to the proposed interchange at the US 17 Wilmington Bypass to allow southbound traffic travelling at high speeds on the US 17 Hampstead Bypass, as well as traffic exiting high-speed ramps from the US 17 Wilmington Bypass, time to safely reduce their speed to a speed that is acceptable (45 mph) for the 30-foot median section on Military Cutoff Road Extension. The minimum distance required for the transition between the two median widths is approximately 480 feet, but the preliminary design includes a transition length of approximately 690 feet based on the anticipated transitional speed of 60 mph in this area.

The Wilmington Metropolitan Planning Organization (MPO) has requested a multi-use path be constructed along proposed Military Cutoff Road Extension (see Appendix B). The multi-use path would tie into an existing multi-use path along Military Cutoff Road. The construction of a multi-use path as part of the proposed project will be dependent upon a cost-sharing and maintenance agreement between NCDOT and the Wilmington MPO. NCDOT will continue to coordinate with the Wilmington MPO on the inclusion of the multi-use path along Military Cutoff Road Extension. If a multi-use path is included along Military Cutoff Road Extension, the ten-foot berm will be expanded to 16 feet to accommodate the path.

#### **2.4.2.3 PROPOSED RIGHT-OF-WAY AND TYPE OF ACCESS**

NCDOT proposes full control of access for the Hampstead Bypass because it would provide greater benefit in terms of traffic service than the partial or no control of access options. For DEIS Detailed Study Alternatives E-H, O, and R, access is proposed at

interchanges with the US 17 Wilmington Bypass, NC 210 and existing US 17 approximately 0.7 mile west of Grandview Drive. Interchange locations for the DEIS detailed study alternatives are shown on Figure 9. For Alternative U, access is proposed at interchanges with the US 17 Wilmington Bypass, the existing US 17 Wilmington Bypass interchange at Market Street, Sidbury Road, NC 210 and existing US 17 approximately 0.5 mile west of Grandview Drive. To provide access to adjacent properties, service roads are proposed for the sections of Alternative U that travel along existing US 17 from Market Street to where Hampstead Bypass transitions to new location. For the DEIS detailed study alternatives, a variable right-of-way width of 250 feet to 350 feet is proposed for Hampstead Bypass Alternatives E-H, O, and R (see Figure 11A). A variable right-of-way width of 250 feet to 520 feet is proposed for Alternative U (see Figures 11A and 11B).

Military Cutoff Road Extension is proposed as a full/limited control of access facility. Access to Military Cutoff Road Extension is proposed at interchanges at Market Street and Military Cutoff Road, and the US 17 Wilmington Bypass. Additional access along Military Cutoff Road Extension with the DEIS detailed study alternatives is proposed at directional crossovers with Putnam Drive, Lendire Road, and Torchwood Boulevard. Only right turns will be permitted onto Military Cutoff Road Extension from these roads. U-turn lanes will be provided to accommodate left turns. A variable right-of-way width of 150 feet to 350 feet is proposed for Military Cutoff Road Extension (see Figure 12).

#### 2.4.2.4 STRUCTURES

Table 2-5 lists the proposed major hydraulic structures for the DEIS detailed study alternatives and the preferred alternative. The NEPA/Section 404 merger team concurred on the size and location of the structures on May 26 and 27, 2010 (see Appendix C). The locations of the structures are shown on Figure 10A for the DEIS detailed study alternatives and Figure 16A for the preferred alternative.

Table 2-5. Proposed Hydraulic Structures

Site No. <sup>1</sup>	Stream ID	Wetland ID	Corridor Alternative	Existing Structure	Recommended Structure
1	ZSB	EWF	U at M1 U at M2	1@12'x8' RCBC <sup>2</sup>	Retain and Extend Existing Culvert
2	---	KWD	U at M1 U at M2	---	1@9'x8' RCBC
3	BSP	BWI	M1 (Preferred Alternative), M2	---	2@7'x12' RCBC
4	---	DWC	M2	---	1@9'x8' RCBC
5	---	GWA	O, R	---	3@12'x7' RCBC

Table 2-5. Proposed Hydraulic Structures *continued*

Site No. <sup>1</sup>	Stream ID	Wetland ID	Corridor Alternative	Existing Structure	Recommended Structure
6	ISA, ISB	IWN	O, R	---	Dual 100' Long Bridges
7	ISD	IWF	O, R	---	3@11'x8' RCBC
8	LSC, LSCC, LSCF	LWD	O, R, Preferred Alternative	3@48" CMP <sup>3</sup>	2@6'x5' RCBC <sup>4</sup>
10	CSA, FSA	---	O, R, U at M1, Preferred Alternative	1@72" RCP <sup>5</sup>	Retain existing and add two 1@72" RCP <sup>6</sup>
11	FSI	---	R, Preferred Alternative	---	1@12'x9' RCBC
15	HBSF, HBSH	HBWK	Preferred Alternative	---	Dual 230' Long Bridges
16	HBSD(2)	HBWD	Preferred Alternative	---	Dual 200' Long Bridges
17	HSX	HWB	Preferred Alternative	---	3@10'x9' RCBC
21	FSA	FWB	R, Preferred Alternative	---	2@11'x9' RCBC
22	FSE	FWC	R, Preferred Alternative	---	2@12'x7' RCBC
23	LSD	LWI	O, R, Preferred Alternative	---	2@9'x7' RCBC
25	HBSC	HBWF	Preferred Alternative	---	1@9'x8' RCBC

<sup>1</sup>Site numbers correspond to the project's Preliminary Hydraulic Study's site numbers. Some preliminary hydraulic sites were avoided during design and are therefore not included in the table.

<sup>2</sup>Reinforced concrete box culvert.

<sup>3</sup>Corrugated metal pipe.

<sup>4</sup>Preliminary design also includes dual 135-foot-long bridges to maintain neighborhood access.

<sup>5</sup>Reinforced concrete pipe.

<sup>6</sup>Retain existing 72" RCP under Wilmington Bypass and add 72" RCP at two interchange ramps. Supplementation of existing 72" pipe or enlarging of proposed ramp pipes will be investigated during final design.

## 2.5 TRAFFIC OPERATIONS ANALYSES

### 2.5.1 ANALYSIS METHODOLOGY

The technical report titled *Traffic Operation Analysis Report, Volume 1, Existing and No-Build Conditions Analysis* (August 2009) documents the traffic operations analysis for existing (2008) and future (2035) no-build travel conditions. The technical report titled *Traffic*

*Operation Analysis Report, Volume 2, Build Conditions Analysis Final* (March 2011) documents the traffic operations analysis for future (2035) build travel conditions. The objective of the traffic operations analysis is to evaluate the existing and future travel conditions and to assess the effectiveness of the proposed Military Cutoff Road Extension and Hampstead Bypass in improving traffic flow within the study area for the detailed study alternatives. The analysis of existing and future no-build travel conditions is discussed in Section 1.3.2.

The future (2035) build travel conditions analysis evaluated freeway capacity for the mainline, merge/diverge junctions, and weaving segments using the methodologies described in the 2000 Highway Capacity Manual. The arterial capacity analyses were performed using the Synchro software program and in accordance with the 2000 Highway Capacity Manual. The intersection capacity analyses were performed using Synchro software and in accordance with NCDOT Signalized Intersection Capacity Analysis Guidelines. Additional details of the methodology and analyses supporting the information provided in this section are provided in the November 2010 Traffic Operation Analysis Report, appended by reference.

## **2.5.2 YEAR 2035 BUILD TRAFFIC PROJECTIONS**

Table 2-6 compares 2035 traffic projections for the detailed study alternatives and the No-Build Alternative for Market Street, US 17, Hampstead Bypass, Military Cutoff Road, and Military Cutoff Road Extension. Year 2035 projected average daily traffic (ADT) volumes for the detailed study alternatives and the surrounding roadway network are shown on Figures 13A through 13D. Volumes shown in Table 2-6 for existing US 17 from I-40 to Sloop Point Loop Road include the new location connector from existing US 17 to the northernmost interchange south of the Topsail Schools complex. The projected ADT for this interchange connector is substantially lower than other segments between these points.

The 2035 traffic forecasts for Alternatives M1+E-H, M2+O, and M1+R indicate that the proposed Military Cutoff Road Extension and Hampstead Bypass projects will divert approximately 30 percent to 50 percent of the future traffic away from Market Street and US 17 between Gordon Road and Sloop Point Loop Road. As a result, traffic flow conditions will be substantially improved in these areas when compared with the traffic flow conditions under the No-Build Alternative.

The 2035 traffic forecasts for Alternatives M1+U and M2+U indicate that the proposed Military Cutoff Road Extension project will divert approximately 15 percent of the future traffic away from Market Street. Similarly, the proposed Hampstead Bypass project will divert approximately 50 percent to 65 percent of the future traffic away from US 17 between NC 210 and Sloop Point Loop Road. As a result, traffic flow conditions will be substantially improved in these areas when compared with the traffic flow conditions under the No-Build Alternative.



Table 2-6. 2035 Traffic Projections for No-Build and Detailed Study Alternatives

	No-Build		M1+E-H & M1+R		M2+O		M1+U		M2+U	
	2035 ADT <sup>1</sup>	% TT <sup>2</sup>	2035 ADT	% TT	2035 ADT	% TT	2035 ADT	% TT	2035 ADT	% TT
<b>Market St. (College Rd. to US 17 Wilmington Bypass)</b>	48,200 – 71,000	5-6	48,600 – 66,000	5-6	48,600 – 66,000	5-6	49,000 – 66,000	5-6	49,400 – 66,400	5-6
<b>Existing US 17 (I-40 to Sloop Point Loop Road)</b>	62,800 – 115,000	8-10	28,600 – 90,000 <sup>3</sup>	5-10	29,600 – 86,000 <sup>3</sup>	5-10	16,800 – 117,000 <sup>3</sup>	5-10	16,800 – 117,000 <sup>3</sup>	5-10
<b>Hampstead Bypass</b>	NA	NA	48,200 – 64,400	10	47,200 – 63,400	10	45,400 – 49,100	5-9	45,400 – 49,100	5-9
<b>Military Cutoff Road</b>	26,000 – 46,000	3	29,200 – 46,500	3	27,200 – 45,500	3	29,200 – 46,500	3	28,600 – 46,000	3
<b>Military Cutoff Road Extension</b>	NA	NA	44,000 – 53,400	7	45,000 – 54,400	7	38,000 – 46,400	7	38,000 – 48,400	7

<sup>1</sup>2035 Average Daily Traffic    <sup>2</sup>Percent Truck Traffic

<sup>3</sup>Volumes include the new location connector to the northernmost interchange south of the Topsail Schools complex and exclude the segment designated as Service Road in the vicinity of Country Club Drive.

### 2.5.3 YEAR 2035 BUILD CAPACITY ANALYSIS

Year 2035 levels of service for the DEIS detailed study alternatives and NCDOT's preferred alternative are shown on Figures 14A through 14E. The figures show 2035 levels of service along the proposed Military Cutoff Road Extension and Hampstead Bypass, including proposed interchanges and signalized intersections. The figures also show the levels of service for several connecting roadways that could experience changes in future traffic volumes as a result of the proposed project, including Market Street/US 17 between College Road and Sloop Point Loop Road, NC 210, and US 17 Wilmington Bypass.

The 2035 freeway and arterial capacity analyses for DEIS Detailed Study Alternatives M1+E-H, M2+O, and M1+R indicate the majority of the mainline segments for the proposed Military Cutoff Road Extension and Hampstead Bypass will operate at an acceptable LOS D or better throughout the day. However, peak hour traffic along Military Cutoff Road Extension will experience queuing issues at several locations. As noted in Section 2.5.2, DEIS Detailed Study Alternatives M1+E-H, M2+O, and M1+R will attract more traffic away from Market Street and US 17 to the proposed Military

Cutoff Road Extension and Hampstead Bypass than Alternatives M1+U and M2+U; however, the traffic demand along Market Street, the US 17 Wilmington Bypass from I-40 to Military Cutoff Road Extension and much of existing US 17 from Market Street to Sloop Point Loop Road will continue to approach or exceed roadway capacity (LOS E and F) with these detailed study alternatives. Nevertheless, travelers will experience improved driving conditions in these areas as the volume of traffic and associated congestion and delays would be reduced.

The 2035 freeway and arterial capacity analyses for DEIS Detailed Study Alternatives M1+U and M2+U indicate that the majority of the mainline segments for the proposed Military Cutoff Road Extension and Hampstead Bypass will operate at an acceptable LOS D or better throughout the day. In addition, with the exception of the Alternative M1+U interchange at the US 17 Wilmington Bypass, the intersection and interchange capacity analyses indicate that peak hour traffic along Military Cutoff Road Extension also will operate at an acceptable LOS D or better. Under Alternatives M1+U and M2+U, additional lanes will be added to the US 17 Wilmington Bypass between Military Cutoff Road Extension and Market Street. Additional lanes will also be added to existing US 17 from Market Street to where Hampstead Bypass transitions to new location. With these improvements in place, the traffic flow conditions in these areas will be improved from LOS F under the No-Build Alternative to LOS D. However, traffic demand along the US 17 Wilmington Bypass from I-40 to Military Cutoff Road Extension and US 17 north of Hampstead Bypass will continue to approach or exceed roadway capacity (LOS E and F), similar to the No-Build Alternative. Nevertheless, travelers will experience improved driving conditions in these areas as the volume of traffic and associated congestion and delays would be reduced.

As discussed above, the proposed project will not eliminate all of the congestion problems on Market Street and US 17. The 2035 intersection capacity analysis for DEIS Detailed Study Alternatives M1+E-H, M2+O, and M1+R indicates that traffic demand at 28 out of the 37 intersections analyzed along Military Cutoff Road, Market Street, existing US 17, and NC 210 would either approach or exceed (LOS E or F) roadway capacity during at least one peak hour of the day. The intersection capacity analysis for Alternatives M1+U and M2+U indicates that traffic demand at 18 out of the 37 intersections analyzed along Military Cutoff Road, Market Street, existing US 17, and NC 210 would either approach or exceed roadway capacity during at least one peak hour of the day. Table 2-7 compares 2035 projected peak hour average delays (in minutes per vehicle) at several intersections along Market Street and existing US 17 for the No-Build Alternative and the DEIS detailed study alternatives.

Delays are shown for the intersections because, with the exception of Leeward Lane, all intersections shown in Table 2-7 exceed roadway capacity (LOS F) during at least one peak hour of the day. Level of service at each intersection is noted in parentheses in Table 2-7. All of the DEIS detailed study alternatives would substantially reduce average peak hour delay at most intersections over the No-Build Alternative.

Table 2-7. 2035 Peak Hour Average Intersection Delay and Level of Service along Existing US 17 and Market Street for No-Build and DEIS Detailed Study Alternatives

Intersection with Market Street or Existing US 17	No-Build		Alternatives M1+E-H and M1+R		Alternative M2+O		Alternative M1+U		Alternative M2+U	
	2035 Peak Hour Average Intersection Delay (minutes per vehicle) and Level of Service <sup>1</sup>									
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Gordon Road	8.8 (F)	7.3 (F)	2.4 (F)	1.8 (F)	2.4 (F)	1.8 (F)	2.4 (F)	2.0 (F)	2.5 (F)	2.0 (F)
Middle Sound Loop Road	4.7 (F)	4.4 (F)	1.5 (F)	1.6 (F)	1.3 (E)	1.5 (F)	3.3 (F)	3.0 (F)	3.1 (F)	3.5 (F)
Porters Neck Road	9.1 (F)	9.4 (F)	5.3 (F)	5.7 (F)	4.9 (F)	5.4 (F)	6.9 (F)	7.5 (F)	6.6 (F)	7.9 (F)
NC 210	9.8 (F)	10.2 (F)	3.3 (F)	3.7 (F)	3.4 (F)	3.9 (F)	2.5 (F)	2.5 (F)	2.5 (F)	2.6 (F)
Hoover Road	5.7 (F)	5.1 (F)	3.9 (F)	4.1 (F)	4.1 (F)	4.1 (F)	2.7 (F)	3.4 (F)	2.8 (F)	3.4 (F)
Country Club Drive/Jenkins Road	>16.7 (F)	15.9 (F)	1.7 (F)	2.2 (F)	1.7 (F)	2.0 (F)	1.9 (F)	1.9 (F)	1.9 (F)	1.9 (F)
Leeward Lane	>16.7 (F)	>16.7 (F)	0.1 (B)	0.1 (B)	0.1 (B)	0.1 (B)	0.1 (B)	0.1 (B)	0.1 (B)	0.1 (B)
Sloop Point Loop Road	4.8 (F)	4.9 (F)	5.1 (F)	5.0 (F)	5.5 (F)	5.4 (F)	5.4 (F)	5.2 (F)	5.4 (F)	5.2 (F)

<sup>1</sup>Level of service is shown in parentheses.

Note: Year 2035 levels of service for the DEIS detailed study alternatives and NCDOT's preferred alternative are shown on Figures 14A through 14E. Year 2035 No-Build level of service is shown on Figure 5.

## 2.6 TRAFFIC SAFETY

The construction of any of the DEIS detailed study alternatives would reduce the amount of traffic on Market Street and existing US 17. This reduction in traffic volumes should in turn reduce the number of accidents occurring on the existing roadways. Market Street and existing US 17 would continue to have occurrences of accidents. However, the anticipated reduction in traffic volumes is expected to have a corresponding reduction in the types of accidents generally associated with traffic congestion. This in turn is expected to result in reduced accident related property damage and injuries.

Both Military Cutoff Road Extension and Hampstead Bypass are proposed median divided facilities. Medians provide separation between opposing traffic and reduce the likelihood of head-on collisions.

Access to Hampstead Bypass will be via interchanges while access to Military Cutoff Road Extension will be provided by interchanges and signalized directional crossovers with U-turn locations. These types of access control can be expected to minimize the number of accidents associated with turning movements.

Severe accidents associated with high speeds on the proposed Hampstead Bypass are expected to be minimal. As noted above, the proposed multi-lane facility would include a median to separate opposing traffic and would be designed to accommodate high-speed traffic.

## **2.7 SELECTION OF NCDOT'S PREFERRED ALTERNATIVE**

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Following distribution of the July 2011 DEIS and the October 2011 corridor public hearings, NCDOT selected Alternative M1+E-H as the preferred alternative for the proposed Military Cutoff Road Extension (U-4751) and US 17 Hampstead Bypass (R-3300) project. The NEPA/Section 404 merger team concurred on NCDOT's preferred alternative as the Least Environmentally Damaging Practicable Alternative (LEDPA) for the proposed project at a merger team meeting held on May 17, 2012 in accordance with the procedures detailed in the NEPA/Section 404 Merger Process.

According to the Merger Process, the LEDPA is the best solution to the problem satisfying the transportation need and considering environmental and community resources. Although the merger team concurred on Alternative M1+E-H as the LEDPA, the final decision on the LEDPA will not be made until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 5.3). A copy of the merger team's signed LEDPA concurrence form is included in Appendix C. NCDOT's preferred alternative is shown on Figure 15 and Figures 16A through 16G.

In selecting its preferred alternative, NCDOT considered impacts calculated based on the proposed preliminary design available at that time. However, it is recognized the preliminary design will continue to be refined within the preferred alternative corridor through final design to address comments from environmental agencies and the public, and to avoid and minimize impacts. Alternative M1+E-H was selected as NCDOT's preferred alternative for the following reasons:

- Alternative M1+E-H is expected to have the fewest impacts to federally-protected species. Cooley's meadowrue stems were found in very close proximity to the right-of-way for Alternatives M2+O and M1+R. A number of rough-leaved loosestrife stems were found within the right-of-way for Military Cutoff Road Extension Alternative M2, which would affect Alternatives M2+O and M2+U.
- Alternative M2 impacts the Plantation Road Mitigation Site, which was in part set aside as a preservation area for rough-leaved loosestrife as a result of a 2002 USFWS Biological Opinion for the US 17 Wilmington Bypass (R-2405A).

- Alternative M1+E-H would have fewer impacts to the NCDOT mitigation sites within the study area (see Sections 3.3.8.3 and 4.3.8.3), as well as to Significant Natural Heritage Areas (SNHAs), than Alternatives M2+O, M2+U, and M1+R.
- Alternatives M1+U and M2+U are not recommended because they have more residential and business relocations, greater noise impacts, greater impacts to cultural resources, more impacts to High Quality Waters watersheds, and greater total costs than Alternatives M1+E-H, M2+O, and M1+R.
- Alternative M2+O is not recommended because it has more impacts to: federally-protected species, existing and proposed future Cape Fear Public Utility Authority (CFPUA) water supply infrastructure, wetlands, and ponds. Alternative M2+O also has more impacts to the NCDOT mitigation sites within the study area (see Sections 3.3.8.3 and 4.3.8.3), as well as to Significant Natural Heritage Areas (SNHAs).
- Alternative M1+E-H has fewer wetland, pond and stream impacts than Alternative M1+R.

Table 2-8 presents a summary comparison of the impacts of the DEIS detailed study alternatives (see Figure 9) as presented at the May 2012 LEDPA meeting.

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## **2.8 DESIGN CHANGES TO THE PREFERRED ALTERNATIVE**

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Following the selection of NCDOT's preferred alternative, the proposed project was reviewed for additional measures that could be incorporated into the preliminary design to further avoid and minimize impacts to the human and natural environment. Changes to the design of the project have also been made in response to citizen comments.

The NEPA/Section 404 merger team met on June 14, 2012 to discuss potential additional avoidance and minimization measures for the Military Cutoff Road Extension (U-4751).

Avoidance and minimization measures for Military Cutoff Road Extension were reviewed separately from the discussion for US 17 Hampstead Bypass (R-3300) in order to maintain the U 4751 project schedule. Additional time was needed prior to discussing avoidance and minimization measures for US 17 Hampstead Bypass so the northern interchange design and location could be further evaluated in response to comments received from the public at the corridor public hearings.

The NEPA/Section 404 merger team met on February 20, 2013 to discuss potential additional avoidance and minimization measures for the proposed US 17 Hampstead Bypass.

The NEPA/Section 404 merger team met on January 22, 2014 to discuss potential avoidance and minimization measures for recommended service roads. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the

Table 2-8. Comparison of Impacts of DEIS Detailed Study Alternatives  
(as presented at May 2012 LEDPA Meeting)

Feature <sup>1</sup>	DEIS Detailed Study Alternatives <sup>2</sup>				
	M1+E-H (Preferred)	M2+O	M1+R	M1+U	M2+U
<b>Length (miles)</b>	17.5	16.6	17.1	18.0	16.8
<b>Delineated Wetland Impacts (acres)</b>	244.58	383.26	295.88	216.88	282.66
<b>Delineated Stream Impacts (linear feet)</b>	23,498	12,859	23,538	14,417	7,803
<b>Delineated Pond Impacts (acres)</b>	3.8	4.2	4.1	3.6	3.6
<b>Displacements</b>					
<b>Residential</b>	64	63	62	96	98
<b>Business</b>	76	76	76	91	91
<b>Non-profit</b>	5	5	5	11	11
<b>Red-cockaded Woodpecker Future Potentially Suitable/Potentially Suitable Habitat (acres)</b>	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39	8.67/ 7.39
<b>Other Surveyed Federal/State Threatened and Endangered Species Habitat Present</b>	Yes	Yes	Yes	Yes	Yes
<b>Natural Heritage Program SNHA, Managed Areas and Wetland Mitigation Sites (acres)</b>	4.43	42.94	5.01	3.24	34.40
<b>Prime Farmlands (acres)</b>	68	58	58	50	50
<b>Forest (acres)</b>	512.97	507.23	466.97	406.97	456.23
<b>100 Year Floodplain and Floodway Impacts (acres)</b>	11.73	8.80	8.80	3.00	3.00
<b>Historic Properties (no.)</b>	1	1	1	3	3
<b>Noise Receptor Impacts</b>	257	236	248	310	304
<b>Recorded Archaeological Sites (no.)</b>	0	0	0	1	1
<b>Wildlife Refuge/Game Lands (acres)</b>	0	0	0	0	0
<b>Recreational Areas/Parks (no.)</b>	0	0	0	0	0
<b>High Quality Waters Watersheds (HQW, ORW, WS Protected or Critical Areas) (acres)</b>	9.19	9.19	9.19	11.99	11.99
<b>Public Water Supply Wells (100' Buffer)</b>	0	0	0	0	0
<b>Cemeteries (no.)</b>	2	2	2	5	5
<b>Potential UST/Hazmat Sites (no.)</b>	4	4	4	4	4
<b>Total Cost (in millions)</b>	\$362.0	\$359.3	\$356.2	\$404.8	\$398.4

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet.

<sup>2</sup>This table presents the impacts for the detailed study alternatives at the May 2012 LEDPA meeting.

two proposed service roads for Military Cutoff Road Extension. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the impacts identified in this FEIS for NCDOT's preferred alternative reflect the incorporation of the agreed upon avoidance and minimization measures for the service roads for both projects.

Avoidance and minimization measures incorporated into the proposed project since the selection of NCDOT's preferred alternative are documented on the NEPA/Section 404 concurrence forms located in Appendix C. Additional avoidance and minimization measures to be evaluated for the proposed project are identified on the concurrence forms and documented in the project commitments.

The following changes have been made to Alternative M1+E-H since its selection as the preferred alternative:

- An interchange was added north of the Topsail Schools complex in response to citizen comments (see Section 2.8.1).
- Shifts have been made in the roadway alignment to minimize wetland and stream impacts (see Section 2.8.2).
- Six lanes are now proposed for the portion of the Hampstead Bypass between the proposed interchange near Grandview Drive to the end of the project at Sloop Point Loop Road to better accommodate future traffic volumes (see Section 2.8.3).
- Changes have occurred in the right-of-way widths and level of access control for some portions of the project to accommodate typical section changes or reduce project impacts on surrounding properties (see Section 2.8.4).
- Service roads have been added to the project to reduce relocatees and project impacts on surrounding properties by maintaining property access (see Section 2.8.5).
- Lendire Road will now be realigned to intersect with Market Street across from Middle Sound Loop Road to improve safety and traffic operations in this area (see Section 2.8.6).

Overall, these changes will result in a reduction in the number of relocations affected by the project, but an increase in the amount of streams and wetlands affected, compared to Alternative M1+E-H as proposed at the time of its selection as the preferred alternative. The selection of Alternative M1+E-H as the preferred alternative remains valid because

most of these same changes would have been required for any of the other DEIS detailed study alternatives (see Section 2.9).

### **2.8.1      ADDITIONAL INTERCHANGE AT NORTHERN END OF US 17 HAMPSTEAD BYPASS**

During development of the preliminary build alternatives, the original proposed northern US 17 Hampstead Bypass interchange (E-H ORIG) was located north of the Topsail Schools complex (Topsail High School, Middle School, and Elementary School), near the project terminus between Leeward Lane and Sloop Point Loop Road. However, the results of a RCW survey in 2008 and foraging habitat analyses in 2009 (updated in January 2011 and December 2012) showed the interchange was located within the foraging habitat for active RCW clusters. Several of the clusters are located within the boundary of Holly Shelter Game Land and are part of the Mid-Atlantic Coastal Plain Recovery Unit. In response, as discussed in Section 2.3, the project team revised the design and the northern US 17 Hampstead Bypass interchange was moved from its location north of the Topsail Schools complex to south of the schools to minimize impacts to RCW foraging habitat.

The relocated northern interchange, to the south of the schools (approximately 0.7 mile west of Grandview Drive), is the design used for the DEIS detailed study alternatives and shown on the public hearing map presented to citizens at the October 2011 corridor public hearings. The design did not provide access to the bypass for existing US 17 north of the schools. In their comments at the hearings, the public strongly specified maintaining access on existing US 17 was very important locally.

In response to the public's demand for continued access on existing US 17, a value engineering study was conducted in December 2011. Several interchange configurations maintaining access on existing US 17 and minimizing impacts to RCW foraging habitat were considered and narrowed down to two options considered to be conceptually viable. Traffic analyses and preliminary designs were prepared for several variations of the two options between December 2011 and December 2012.

The initial goal was to replace the currently proposed interchange south of the Topsail schools with an interchange north of the schools. Adjustments were made to the alignment of the bypass and a reduced design was used to develop an interchange that would fit between the school property and the RCW foraging habitat.

However, when detailed capacity analyses were performed on this design, it was discovered that traffic would back up onto the bypass from the traffic signal at Topsail High School. Adding a third lane onto existing US 17 at the school would alleviate this queuing, but the signal at the school would still not operate at an acceptable level of service.

Concerns regarding the operation of existing US 17 at the schools led the project team to consider keeping the currently proposed interchange south of the schools in addition to the newly designed interchange north of the schools. When traffic capacity analyses



were performed on the dual interchange option, it was found that the signal on existing US 17 at the Topsail Schools complex would operate acceptably and there would be no queuing onto the bypass.

The two northern interchange options considered in the final analysis are described below.

#### **2.8.1.1 NORTHERN INTERCHANGE OPTIONS**

The two northern interchange options considered were Options 6R and 6TR. Option 6TR (see Figure 17) would construct an interchange north of the schools in addition to the current proposed northern interchange south of the schools.

Option 6R (see Figure 18) would construct an interchange north of the schools in place of the current proposed northern interchange south of the schools. Option 6R includes a service road to provide access to existing development on the east side of existing US 17 north of the school.

Both Option 6R and Option 6TR are located within the US 17 Hampstead Bypass Alternative E-H corridor. Both options would construct an interchange between the Topsail Schools complex and RCW foraging habitat. Both would avoid a Pender County water tower located adjacent to the schools. Both options would use a reduced design to fit between the constraints of the schools and RCW foraging habitat.

Due to their close proximity, a third lane is proposed in each direction between the two northernmost interchanges on US 17 Hampstead Bypass under Option 6TR. The additional lane serves as an auxiliary lane to allow for acceleration, deceleration, and weaving. The third lane extends in each direction along the connection between the interchange west of Grandview Drive and existing US 17.

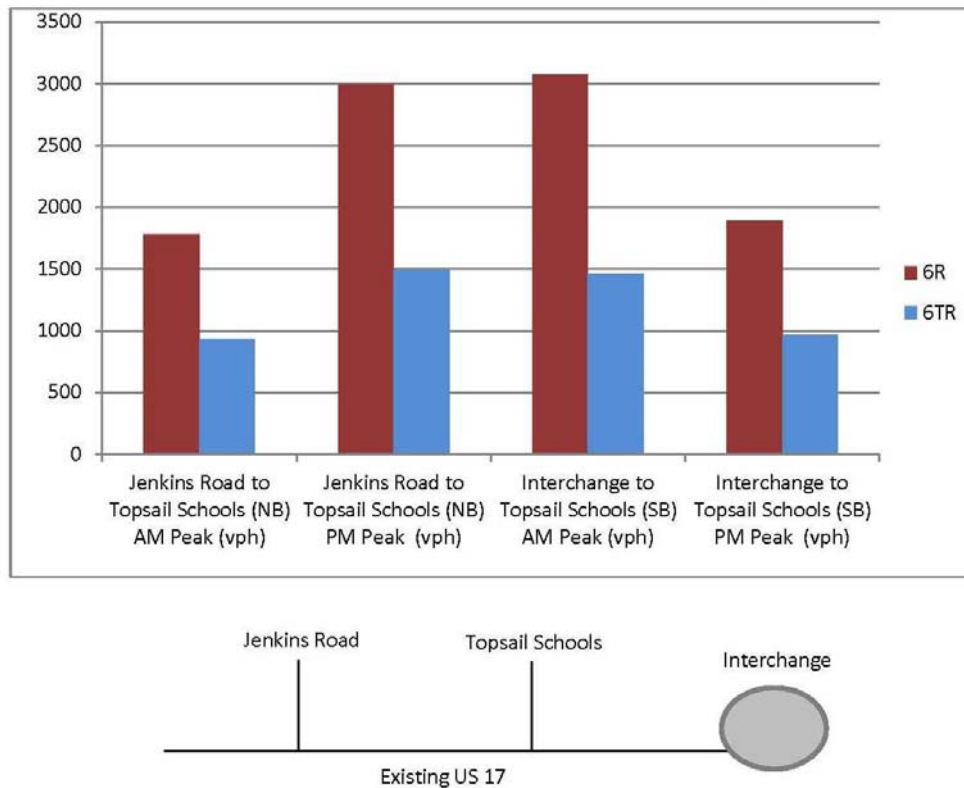
With one interchange (Option 6R), there would be 39,200 to 41,000 vehicles per day using existing US 17 in front of the Topsail Schools complex. With two interchanges (Option 6TR), the number of cars in front of the schools is reduced by over 50 percent, to 19,800 vehicles per day.

Option 6R requires a third through lane in each direction on existing US 17 between the interchange and Country Club Drive to prevent cars from backing up onto the bypass. Option 6TR does not require additional through lanes on existing US 17 between the two northern interchanges.

With the addition of a lane in each direction on existing US 17 to reduce queuing issues, both options improve traffic conditions over the existing interchange configuration; however, overall traffic operations are better with Option 6TR. Figures 19 and 20 present the level of service and the peak hour traffic volumes for the northern part of the bypass and existing US 17 with the two options. With one interchange (Option 6R), about 2,700 vehicles per hour travel southbound on existing US 17 in the morning at the schools. With two interchanges (Option 6TR), the number would drop by over a

thousand vehicles per hour to approximately 1,300. The signal at the school would operate at a better level of service, as well. The graphic below illustrates traffic operations in front of the Topsail Schools complex are better under Option 6TR.

**Peak Hour Traffic Volumes Comparison in the Vicinity of Topsail Schools Complex**



Figures 19 and 20 also show how much traffic would use the interchange north of the school. With the single interchange option, 2,195 vehicles per hour in the morning would use the flyover to access existing US 17 from southbound US 17. With two interchanges, the volume drops to 885 vehicles per hour. As noted above, due to the constraints with the school and the RCW foraging habitat, this northern interchange is smaller than a typical interchange. The design is more appropriate for a local access interchange carrying lower volumes than the higher volumes it would have to carry if it were the only interchange at the northern end of the project.

#### **2.8.1.2 BASIS FOR SELECTION OF OPTION 6TR**

Option 6TR, with two interchanges, is the preferred option for the US 17 Hampstead Bypass Alternative E-H northern interchange configuration for the following reasons:

- Option 6TR distributes existing US 17 traffic between two interchanges, resulting in better level of service, while all traffic is concentrated at one interchange under Option 6R.
- The northern interchange is adjacent to three schools. Two interchanges will reduce the traffic and congestion in the vicinity of the Topsail Schools complex.
- Traffic studies for the northern interchange options showed a single interchange (Option 6R) would present queuing issues at the signal in front of the Topsail Schools complex. This queuing would result in traffic backing up onto the US 17 Hampstead Bypass. To address this issue, an additional lane was added to existing US 17 in each direction in the vicinity of the schools to help prevent cars from backing up onto the bypass at this location. However, the signal in front of the schools would continue to function at an unacceptable level of service with one interchange. The two interchange design with Option 6TR eliminates the queuing issues at the signal in front of the schools and prevents traffic from backing up onto the bypass (without adding additional lanes to existing US 17). In addition, the signal in front of the schools will operate at an acceptable level of service with Option 6TR.
- An increase in traffic or a traffic incident on existing US 17 in front of the Topsail Schools complex, such as from an accident or special school events, would be more prone to cause backups onto the US 17 Hampstead Bypass under Option 6R.
- The second interchange provided under Option 6TR will result in better traffic circulation for the Hampstead area. With the single interchange option, there would be over five miles between interchanges.
- The northern interchange has a reduced design in order to minimize impacts to RCW foraging habitat and the schools, while restoring access to existing US 17. This reduced design is more appropriate for a local access interchange than for a major interchange.
- No service roads are required to provide access to existing development on the east side of existing US 17 north of the Topsail Schools complex with Option 6TR.
- More crashes could be expected at the intersection at the school with one interchange, due to the increased exposure and opportunity for conflicts. The six lanes required in front of the school with one interchange would make it more difficult to accommodate pedestrians and bicycles at the intersection and there would be more lane changing and weaving conflicts in the area. With two interchanges, there is better dispersion of traffic in the area.

Table 2-9 provides a further comparison of the two northern interchange options.

The merger team concurred, with one abstention, on avoidance and minimization measures for the proposed US 17 Hampstead Bypass that include Option 6TR on June 13, 2013. The NEPA/Section 404 merger team met on January 22, 2014 to discuss potential avoidance and minimization measures for recommended service roads for both projects. The merger team agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed

Table 2-9. Comparison of Northern Interchange Options 6R and 6TR

Option 6R		Option 6TR
3	No. of Lanes Needed in Front of School to Resolve Queuing Back-up onto Hampstead Bypass	2
Higher speeds from freeway free flow ramp	Southbound Approach to Topsail Schools Complex	Lower speeds from stop at T-intersection
41,200 / 39,200	AADT North/South of Topsail Schools Complex Intersection (vpd)	19,800 / 19,800
D – E – F	Level of Service at: Northern Interchange – Schools – Jenkins Rd.	C – C – D
Greater than 5 miles between interchanges	Local Access	Better local traffic circulation
Reduced design less appropriate for a major interchange	Design	Reduced design more appropriate for local access interchange
More likely	Likelihood a Traffic Event at Schools Would Result in Backup onto Bypass	Less likely

service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored.

If RCW foraging habitat ceases to exist at the northern interchange at the time NCDOT applies for authorization from USACE to construct the project, the Department will revisit the original interchange design, known as Alternative E-H ORIG. As currently described, Alternative E-H ORIG would further minimize wetland impacts compared to Alternative E-H with Option 6TR, which is NCDOT's preferred.

### **2.8.2 ROADWAY ALIGNMENT**

To reduce impacts to wetland and streams, three shifts in the alignment of Alternative E-H for the Hampstead Bypass have been made within the study corridor since the selection of this alternative. These alignment shifts have been made in the vicinity of Harrison Creek Road, NC 210 and Holiday Drive. These shifts reduced wetland and stream impacts for the project by 13.54 acres and 595 feet, respectively.

Alternative M1 for Military Cutoff Road Extension was realigned north of Torchwood Boulevard in the vicinity of the Cape Fear Public Utility Authority's Nano Water Treatment Plant. This shift avoids the 100-foot buffer area around two wells on the water treatment plant property and reduces wetland and stream impacts by 0.78 acre and 677 feet, respectively.

### **2.8.3 TYPICAL SECTIONS**

At the time of the selection of the LEDPA, the portion of the proposed US 17 Hampstead Bypass north of NC 210 was to be built as a four-lane roadway, even though traffic volumes north of the proposed interchange near Grandview Drive warrant six lanes (see Section 2.5.2). It was believed at that time any clearing greater than 200 feet in the vicinity of RCW foraging habitat along existing US 17 north of the Topsail Schools complex would result in the take of additional RCW clusters.

Six lanes are now proposed for the portion of the US 17 Hampstead Bypass between the interchange near Grandview Drive and the end of the project at the US 17/Sloop Point Loop Road intersection. A third lane in each direction was added to the bypass from the proposed interchange north of the schools to Sloop Point Loop Road to inhibit traffic from backing up onto the bypass. A third lane in each direction also was added to the bypass from the proposed interchange near Grandview Drive to the proposed interchange north of the schools to accommodate traffic. The third lane will serve as an auxiliary lane to allow for acceleration, deceleration, and weaving between the two interchanges. The revised typical section will not result in the take of an additional RCW cluster. Figure 11C shows the proposed typical sections for Hampstead Bypass for the preferred alternative.

### **2.8.4 RIGHT-OF-WAY AND ACCESS CONTROL**

Following selection of the preferred alternative, control of access was reduced along Market Street both north and south of the Military Cutoff Road Extension interchange to minimize impacts to properties on Market Street. Loops and ramps in the interchange were tightened. It is expected that the design modifications will result in eight fewer residential relocations and 33 fewer business relocations.

A variable right-of-way width of 225 feet to 350 feet is now proposed for the Hampstead Bypass. Since the completion of the DEIS, it was determined the proposed clearing for the six-lane northern section of the proposed bypass, including along the portion of existing US 17 between the bypass tie-in and Sloop Point Loop Road, will exceed 200

feet in some areas. The proposed right-of-way width through RCW Cluster 17 is now 250 feet, and through Cluster EC is now 225 feet. Based on new proposed regional RCW Standard for Managed Stability (SMS) foraging habitat guidelines that USFWS agreed to use for this project (see Section 4.5.4.3 of this document), the December 2012 foraging habitat analysis found clearing greater than 200 feet along existing US 17 within the foraging partitions would not result in the take of an additional RCW cluster. The commitment to maintain a maximum right-of-way width of 200 feet in the vicinity of Holy Shelter Game Land has been removed from the Project Commitments section of this FEIS.

## **2.8.5 SERVICE ROADS**

The proposed Military Cutoff Road Extension and US 17 Hampstead Bypass will remove access to a number of properties that would otherwise be unaffected by the projects. As a result, NCDOT completed service road studies for both projects. The September 2013 SDEIS included a total of 14 potential service roads that were under evaluation for inclusion in the proposed project: two for Military Cutoff Road Extension (SR1 and SR4) and twelve for US 17 Hampstead Bypass (SR5 through SR16).

Following the release of the SDEIS, NCDOT completed the evaluation of the cost effectiveness of the 14 potential service roads. For a potential service road to be cost effective, the cost of providing the service road (construction cost, right-of-way cost, and wetland/stream mitigation cost) should be less than the cost of not providing access to the properties served by the service road.

Four of the potential service roads discussed in the SDEIS for US 17 Hampstead Bypass (SR7, SR9, SR12, and SR15) were determined not cost effective and have been dropped from further consideration. The ten service roads determined cost effective are further evaluated from an environmental standpoint in this FEIS. An overview of the locations of the ten proposed service roads is shown on Figures 16A through 16G. The only purpose of the ten proposed service roads is to restore existing access.

Three of the potential service roads analyzed in NCDOT's initial service road studies (SR3 [dropped prior to completion of the SDEIS], SR8 and SR16) extended slightly outside of the project study area identified in the 2011 DEIS. As a result, extended study areas were added to the project in August 2013. Corresponding field investigations were conducted by qualified biologists in the extended areas on August 20, 2013 and September 6, 2013. The results of these site surveys for the potential service roads are incorporated into the discussion of existing conditions within the project study area in Chapter 3 of this FEIS.

The discussion of impacts for the preferred alternative in Chapter 4 of this FEIS includes the anticipated impacts as a result of the ten proposed service roads. Table 2-10 summarizes the anticipated impacts and estimated total savings, or cost deficit, associated with the service roads included in the SDEIS. None of the ten proposed service roads would impact protected species, historic properties, recorded archaeological sites, wildlife

Table 2-10. Summary of Impacts for Proposed Service Roads

Feature <sup>1</sup>	Service Roads														
	SR1	SR4 <sup>2</sup>	SR5	SR6 <sup>2</sup>	SR7 <sup>3</sup>	SR8	SR9 <sup>3</sup>	SR10 <sup>4</sup>	SR11	SR12 <sup>3</sup>	SR13	SR14	SR15 <sup>3</sup>	SR16	Total
Length (miles)	0.16	0.45	0.26	0.09	0.39	0.16	0.11	0.33	0.55	0.38	0.22	1.34	0.29	0.51	4.07
Delineated Wetland Impacts (acres)	0.00	2.24	0.19	0.02	0.50	0.00	0.00	0.00	0.55	0.32	0.26	7.88	2.44	1.90	13.04
Delineated Stream Impacts (linear feet)	0	0	72	0	0	0	0	0	101	0	0	0	0	0	173
Delineated Surface Water Impacts															
▪ Stormwater ponds with a connection to tributary waters (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
▪ Stormwater ponds with no connection to tributary waters (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
▪ Tributary waters determined to be jurisdictional based on the presence of an OHWM (square feet/acres)	0.00	12,262.80/ 0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	624.80/ 0.01	12,887.60/ 0.30
Displacements <sup>5</sup>															
▪ Residential	0	0	-5	0	0	0	0	0	-7	-2	-5	0	0	-2	-19
▪ Business	-3	0	-1	0	0	0	0	-1	0	0	0	0	0	0	-5
▪ Non-profit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forest (acres)	0.16	0.32	0.25	0.66	4.17	1.66	1.12	1.22	2.65	1.04	0.97	14.26	0.00	2.66	24.81
100 Year Floodplain and Floodway Impacts (acres) <sup>6</sup>	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	2.39	4.39
Noise Receptor Impacts	The DEIS Traffic Noise Technical Memorandum was not updated for the service roads. Impacted noise receptors will be updated in a Design Noise Report and recommended noise barrier locations will be reviewed.														
High Quality Waters Watershed (HQW, ORW, WS Protected or Critical Areas) (acres)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.63
Total Savings or Cost Deficit (in millions)	-\$0.325	-\$0.403	-\$1.436	-\$1.065	+\$0.665	-\$1.550	+\$0.080	-\$0.423	-\$1.188	+\$0.175	-\$0.923	-\$7.659	+\$0.098	-\$0.326	-\$15.298

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet. Service road slope stakes plus 25 feet boundaries clipped to mainline proposed ROW file to avoid overlap when calculating impacts (where applicable).

<sup>2</sup>Impacts include avoidance and minimization measures incorporated into the preliminary designs of SR4 and SR6 since the SDEIS.

<sup>3</sup>Shaded columns indicate service roads that were included in the September 2013 SDEIS, but that were subsequently determined to not be cost effective. These service roads have been dropped from further consideration, so their individual impacts are not included in the total service road impacts.

<sup>4</sup>Based on the results of NCDOT’s service road study for the US 17 Hampstead Bypass, the alignment of SR10 was revised since the completion of the SDEIS in order to restore access to an additional large property (323 acres) and make SR10 cost effective. However, the revised alignment increased the length of SR10 by 0.15 mile and increased forest impacts by 0.97 acre since the SDEIS.

<sup>5</sup>Number of residential and business displacements saved with service road.

<sup>6</sup>Floodplain impacts were derived from most recent NC Floodplain dataset.





refuges or game lands, recreational areas, parks, Significant Natural Heritage Areas, cemeteries, potential underground storage tanks (UST), or hazardous material (Hazmat) sites. All ten of the proposed service roads will impact forested areas.

The ten recommended service roads were presented to the NEPA/Section 404 merger team at a meeting held on January 22, 2014. At this meeting, the merger team discussed avoidance and minimization measures for the service roads. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension and these measures were incorporated into the September 2012 Avoidance and Minimization concurrence form. The revised Avoidance and Minimization concurrence form for Military Cutoff Road Extension was signed on April 23, 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the summary of anticipated impacts for the service roads in Table 2-10 reflects the incorporation of the agreed upon avoidance and minimization measures for both projects.

## **2.8.6 LENDIRE ROAD IMPROVEMENTS**

Final design is underway for Military Cutoff Road Extension. Since the release of the SDEIS, the final design team has proposed to realign Lendire Road to form an intersection with Middle Sound Loop Road at Market Street (see Figure 21). The proposed improvements are expected to improve traffic operations along the Market Street corridor by eliminating the existing unsignalized T-intersection at Lendire Road and Market Street. The Middle Sound Loop Road/Market Street intersection is currently a four-legged intersection, with Middle Sound Loop Road “stubbed-out” approximately 400 feet to the west of Market Street. The Lendire Road realignment will tie into the stubbed-out section of Middle Sound Loop Road. The third southbound lane and median on Market Street shown in the preliminary design plans from the Military Cutoff Road Extension interchange north to Ogden Park Drive are extended to north of the realigned intersection as part of the proposed improvements. These improvements are designed to manage increased traffic from the Lendire Road realignment and further improve safety along Market Street.

The proposed Lendire Road improvements extend outside of the study area boundary identified in the 2011 DEIS and SDEIS. Figure 16B and Figure 21 show the approximately 36-acre extended study area that was added to the project to encompass the proposed Lendire Road improvements. Corresponding field investigations were conducted by qualified biologists in the extended area on August 20, 2013 and September 6, 2013. The results of these site surveys for the Lendire Road improvements

are incorporated into the discussion of existing conditions within the project study area in Chapter 3 of this FEIS.

The discussion of impacts for the preferred alternative in Chapter 4 of this FEIS includes the impacts as a result of the Lendire Road improvements. Because the study area for the Lendire Road improvements is located in a heavily developed area along the Market Street corridor, the entire 35.9-acre study area is classified as maintained/disturbed. The proposed improvements would impact approximately 2.30 acres of maintained/disturbed area. The proposed Lendire Road improvements would have no effect on protected species, wildlife refuges or game lands, recreational areas, parks, or Significant Natural Heritage Areas, potential USTs, or Hazmat sites. However, as discussed in Section 4.4.1, the proposed Lendire Road improvements would result in additional impacts to the National Register-eligible Mount Ararat AME Church. The adverse effect determination for this historic property discussed in the 2011 DEIS did not change. Additional work now proposed along Market Street adjacent to the church necessitated a revised merger team commitment for avoidance and minimization measures at the church (see Section 4.4.1).

#### **2.8.7 OTHER DESIGN CHANGES FOR AVOIDANCE AND MINIMIZATION**

In addition to the design changes described in previous sections, the design changes listed below are also proposed to the preferred alternative to minimize impacts to wetlands and streams:

- A retaining wall and guardrail is now proposed to minimize impacts to stormwater ponds in the Food Lion shopping center, located on the west side of existing Military Cutoff Road just south of Market Street.
- Loops and ramps in the Military Cutoff Road Extension interchange at Market Street were tightened, reducing wetland impacts by 0.89 acre.
- A retaining wall was added on the west side of proposed Military Cutoff Road Extension south of Putnam Drive to avoid impacts to wetland PD-01 (-0.07 acre).
- The design of the Military Cutoff Road Extension interchange with the US 17 Wilmington Bypass was modified. The ramp in Quadrant D was pulled in, reducing wetland impacts by 1.16 acres. This design change also reduced impacts to the Plantation Road Mitigation Site by 0.02 acre and impacts to the Corbett Tract Residual Strip were reduced by 0.07 acre.

The NEPA/Section 404 merger team concurred with these avoidance and minimization measures on September 25, 2012.

### **2.9 VALIDITY OF MERGER TEAM LEDPA DECISION**

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The changes now proposed for Alternative M1+E-H do not invalidate the NEPA/Section 404 merger team's concurrence on that alternative as the LEDPA for the project

in accordance with the procedures detailed in the NEPA/Section 404 Merger Process, or the selection of Alternative M1+E-H as NCDOT's preferred alternative.

The addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) would result in similar changes in impacts to all of the DEIS detailed study alternatives, as shown in Table 2-11 below. The table shows the increase or decrease in impacts to environmental features for the DEIS detailed study alternatives with Option 6TR incorporated into the design of each alternative. Features for which there is no change in the impacts are not included in the table. See Figure 9 for the DEIS detailed study corridor alignments.

Table 2-11. Change (+/-) in DEIS Detailed Study Alternatives Impacts with R-3300 Northern Interchange Option 6TR

Feature <sup>1</sup>	Impact Change – DEIS Detailed Study Alternative				
	M1+E-H (Preferred)	M2+O	M1+R	M1+U	M2+U
<b>Delineated Wetland Impacts (acres)</b>	+17.89	+17.89	+17.89	+17.75	+17.75
<b>Delineated Stream Impacts (linear feet)</b>	+681	+681	+681	+959	+959
<b>Delineated Pond Impacts (acres)</b>	+0.73	+0.73	+0.73	+0.72	+0.72
<b>Residential Displacements<sup>2</sup></b>	No change	No change	No change	No change	No change
<b>Business Displacements<sup>2</sup></b>	-3	-3	-3	-3	-3
<b>Forest (acres)</b>	+8.62	+8.62	+8.62	+8.38	+8.38
<b>100 Year Floodplain and Floodway Impacts (acres)</b>	+1.2	+1.2	+1.2	+1.4	+1.4
<b>High Quality Waters Watershed (HQW, ORW, WS Protected or Critical Areas) (acres)</b>	+10.9	+10.9	+10.9	+10.9	+10.9
<b>Cemeteries (no.)</b>	+1	+1	+1	+1	+1
<b>Potential UST/Hazmat Sites (no.)</b>	+1	+1	+1	+1	+1

<sup>1</sup>Impact calculations are based on preliminary design slope stake limits plus an additional 25 feet.

<sup>2</sup>Displacements are calculated based on proposed right-of-way limits. These numbers reflect changes associated with northern interchange Option 6TR only. Changes in impacts as a result of avoidance and minimization measures elsewhere along the project are not included in the table.

Alternative M2+O was not selected by the merger team as the LEDPA because it would have more impacts to federally-protected species, proposed future CFPWA water supply infrastructure, wetlands, ponds, and preservation areas. Alternative M1+R was not

selected because it would affect more preservation areas, wetlands, ponds, and streams. Alternatives M1+U and M2+U were not selected as the LEDPA because they would have more residential and business relocations, greater noise impacts, and greater impacts to cultural resources. As Table 2-11 shows, the addition of an interchange and the change from four lanes to six lanes in the northern section would not have affected these factors.

Table 2-12 provides an additional comparison of the impacts of the DEIS detailed study alternatives as presented at the May 2012 LEDPA meeting, but with the impacts of the additional northern interchange (Option 6TR) and the ten proposed service roads included. The updated table represents a comprehensive comparison of the US 17 Hampstead Bypass detailed study alternatives for all impact categories. DEIS Detailed Study Alternatives M2+U and M2+O are not included in the updated table because Alternative M2 and the Hampstead Bypass alternatives associated with it were dropped primarily due to impacts to federally-protected species.

Table 2-12 was developed by combining the information in Table 2-8 and Table 2-11, along with the impacts for the ten proposed service roads discussed in Section 2.8.5. Additional information also was added to update the other impact categories in Table 2-8. The updated table also includes avoidance and minimization measures incorporated into the preliminary design of the preferred alternative for Military Cutoff Road Extension (Alternative M1), as well as impacts for potential permanent utility easements that may be needed with the alternatives. Not all of the ten proposed service roads for the preferred alternative are needed with the other two detailed study alternatives included in Table 2-12, so only the needed service roads were applied to the other alternatives. In addition, there may be locations where the other detailed study alternatives need additional service roads that are not included in the updated comparison table, so total impacts shown in the table for some of the detailed study alternatives other than the preferred alternative may be low.

As shown in Table 2-12, the inclusion of Option 6TR and the service roads caused the impacts for all of the DEIS detailed study alternatives to increase, but the relative difference between the impacts for the detailed study alternatives did not change substantially. Therefore, the factors leading to the choice of Alternative M1+E-H as the LEDPA have not changed. The NEPA/Section 404 merger team reaffirmed its concurrence on Alternative M1+E-H as the LEDPA for the project via an e-mail exchange completed on April 30, 2014. USEPA continued to abstain<sup>2</sup> from concurrence on US 17 Hampstead Bypass Alternative E-H as the LEDPA for Project R-3300.

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<sup>2</sup>Under the Merger Process, abstain means that a team member does not actively object to a concurrence point but the agency representative does not sign the concurrence point form. The process may continue and the agency representative agrees not to revisit the concurrence point.

Table 2-12. Comparison of Impacts of DEIS Detailed Study Alternatives at LEDPA with Option 6TR and Service Road Impacts Added

Feature	DEIS Detailed Study Alternatives					
	M1+E-H (Preferred)		M1+R		M1+U	
	As Presented at LEDPA Meeting	M1+E-H (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>	As Presented at LEDPA Meeting	M1+R (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>	As Presented at LEDPA Meeting	M1+U (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>
Length (miles)	17.5	17.5	17.1	17.1	18.0	18.0
No. of Interchanges	4	5	4	5	7	8
Delineated Wetland Impacts (acres)	244.58	275.32	295.88	326.41	216.88	246.22
Delineated Stream Impacts (linear ft.)	23,498	23,837	23,538	23,805	14,417	14,838
Delineated Pond Impacts (acres)	3.80	4.58	4.10	4.88	3.60	4.37
Delineated Surface Water Impacts: Tributary Waters Determined to Be Jurisdictional Based on the Presence of an OHWM (sq. ft./acres)	Included in stream impacts at LEDPA.	10,976.60/0.25	Included in stream impacts at LEDPA.	10,976.60/0.25	Included in stream impacts at LEDPA.	10,976.60/0.25
Displacements <sup>2</sup>						
Residential	64	60	62	58	96	97
Business	76	35	76	36	91	52
Non-profit	5	3	5	5	11	11
Red-cockaded Woodpecker Cluster Level Take	1	1	1	1	1	1
Other Federally Protected Species Impacts	Yes (M1 only)	Yes (M1 only)	Yes (M1 and R)	Yes (M1 and R)	Yes (M1 only)	Yes (M1 only)
Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)	4.43	4.55	5.01	5.13	3.24	3.36
Prime and Unique Farmland Soils (acres) <sup>3</sup>	68	88	58	74	50	64

Table 2-12. Comparison of Impacts of DEIS Detailed Study Alternatives at LEDPA with Option 6TR and Service Road Impacts Added *continued*

Feature	DEIS Detailed Study Alternatives					
	M1+E-H (Preferred)		M1+R		M1+U	
	As Presented at LEDPA Meeting	M1+E-H (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>	As Presented at LEDPA Meeting	M1+R (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>	As Presented at LEDPA Meeting	M1+U (Option 6TR) with Service Roads and Permanent Utility Easements <sup>1</sup>
Forest (acres)	512.97	553.73	466.97	506.82	406.97	435.48
100 Year Floodplain and Floodway Impacts (acres)	11.73	17.39	8.80	14.46	3.00	8.79
Historic Properties (no.)	1	1	1	1	3	3
Noise Receptor Impacts	257	257	248	248	310	310
Recorded Archaeological Sites (no.)	0	0	0	0	1	1
Wildlife Refuge/ Gamelands (acres)	0	0	0	0	0	0
Recreational/ Parks (no.)	0	0	0	0	0	0
High Quality Waters Watershed (HQW, ORW, WWS PA/CA) (acres)	9.19	21.03	9.19	21.03	11.99	23.83
Public Water Supply Wells (100' Buffer)	0	0	0	0	0	0
Cemeteries (no.)	2	3	2	3	5	6
Potential UST/Hazmat Sites (no.)	4	5	4	5	4	5
Total Cost (in millions)	\$362.0	\$340.3	\$356.2	\$337.0	\$404.8	\$389.7

<sup>1</sup>Includes avoidance and minimization measures incorporated into the design of Alternative M1. Also reflects the elimination of SR12 as a cost effective service road since the table was originally provided to the merger team in March 2014.

<sup>2</sup>Displacements reflect the revised relocation reports prepared for NCDOT's preferred alternative (see Appendix E). The revised relocation reports are based on detailed field review by specialists in NCDOT's Right-of-Way Unit and reflect the current preliminary design, including service roads and permanent utility easements. Residential displacements shown in the relocation report are higher than preliminary estimates prepared using GIS and project mapping, which may not reflect factors identified during field review (e.g., septic tanks, wells, recent construction, etc.).

<sup>3</sup>NRCS changed their method for calculating impacts to prime and unique farmland soils since completion of the DEIS and LEDPA selection. In the past, NRCS did not include land zoned for urban uses as prime and

Table 2-12. Comparison of Impacts of DEIS Detailed Study Alternatives at LEDPA with Option 6TR and Service Road Impacts Added *continued*

unique farmland in the impact calculations. As of August 2012, NRCS considers areas zoned for urban uses with prime and unique farmland soils as impacts unless the land is in areas considered urban or non-agricultural by NRCS. The prime and unique farmland impacts shown in Table 2-12 for the DEIS detailed study alternatives were calculated using the old methodology and presented at the May 2012 LEDPA meeting. The prime and unique farmland impacts used in Table 2-12 for the service roads were calculated using the new methodology during preparation of this FEIS. Updated prime and unique farmland impacts for Alternative M1+E-H (Preferred) using the new methodology are presented in Section 4.3.3 of this FEIS.

## 2.10 PROJECT SCHEDULE AND COSTS

Project U-4751 is programmed in the draft 2013-2023 NCDOT Program and Resource Plan for right-of-way acquisition in State Fiscal Year (SFY) 2014, and construction in SFY 2017. The current cost included in the draft Program and Resource Plan for U-4751 is \$111,108,000. Project R-3300 is programmed in the draft Program and Resource Plan for right-of-way acquisition in SFY 2017 and construction in SFY 2023. The current cost included in the draft Program and Resource Plan for R-3300 is \$233,040,000. Table 2-13 shows the current cost estimate for NCDOT's preferred alternative based on the current preliminary design.

Table 2-13. Current Cost Estimate for NCDOT's Preferred Alternative

M1+E-H (Preferred Alternative)	Cost Estimate
Right-of-Way Acquisition	\$108,250,000
Utility Relocation	\$1,368,734
Wetland and Stream Mitigation	\$44,071,618
Construction	\$305,207,130
<b>Total</b>	<b>\$458,897,482</b>





## **3.0 AFFECTED ENVIRONMENT**

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This chapter describes the existing conditions and characteristics of the study area that could be affected by the proposed extension of Military Cutoff Road and the proposed US 17 Hampstead Bypass. The chapter includes comprehensive information relating to the study area as a whole rather than providing separate descriptions of the area as it relates to each DEIS detailed study alternative and NCDOT's preferred alternative. Information presented relates to the existing social, economic, cultural, physical, and natural environment settings. This chapter provides the basis for determining the specific impacts of the DEIS detailed study alternatives and NCDOT's preferred alternative, as discussed in Chapter 4. The descriptions of the existing conditions and characteristics of the study area included in this chapter have been updated since the 2011 DEIS where new information was available at the time of study.

Extended study areas totaling approximately 71.9 acres have been added to the project since completion of the DEIS. These extended areas are associated with the changes to NCDOT's preferred alternative that extend outside of the project study area identified in the 2011 DEIS. The descriptions of the existing conditions and characteristics of the study area included in this chapter have been updated since the 2011 DEIS, as needed, to reflect the addition of these extended study areas. Section 3.5 discusses the additional field investigations that were performed since the 2011 DEIS to update the natural environment characteristics of the study area to include the extended study areas.

### **3.1 HUMAN ENVIRONMENT**

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A Community Impact Assessment and Qualitative Indirect and Cumulative Effects Assessment was prepared for the proposed project in June 2009. This information was updated in an Indirect and Cumulative Effects Screening Report and Land Use Scenario Assessment in September 2013. City, county, state, and demographic area data were compared to identify characteristics and trends, and draw conclusions about the study area. The demographic area includes portions of New Hanover County, Pender County, and the City of Wilmington in and around the study area. Copies of both reports, appended by reference, are located in the project file.

#### **3.1.1 POPULATION CHARACTERISTICS**

Between 2000 and 2010, the population in New Hanover County increased by 26.4 percent, and the population in Pender County increased by 27.1 percent (see Table 3-1). This equates to an annualized growth rate of 2.4 percent for both counties. The City of Wilmington experienced an even higher annualized growth rate at 3.5 percent.

Between 2000 and 2010, the population in the demographic area increased by 41.4 percent, which is substantially higher than the population growth experienced by either of the counties or the State but consistent with the City of Wilmington's growth during the same time period. This represents an annualized growth rate for the demographic

area of approximately 3.5 percent. Local planners expect this trend to continue, primarily because of the area's desirable location.

In comparison to New Hanover County, Pender County, Wilmington, and the State, the demographic area has a higher percentage of Whites. The demographic area is 88.1 percent White, 9.5 percent Black or African American, 1.8 percent Hispanic or Latino, and less than one percent each of other races (American Indian, Asian, Pacific Islander, etc.).

Table 3-1. Population Growth Trends 2000-2010

	2000 Total Population	2010 Total Population	Population Change 2000-2010	Population Percent Change 2000-2010	
				Overall	Annualized
North Carolina	8,049,313	9,535,471	1,486,158	18.5%	1.7%
New Hanover County	160,307	202,681	42,374	26.4%	2.4%
Pender County	41,082	52,203	11,121	27.1%	2.4%
Wilmington	75,838	106,476	30,638	40.4%	3.5%
Demographic Area	25,966	36,714	10,748	41.4%	3.5%

Source: US Census Bureau, Summary File 1 (100% data), Table P001 (2000), P1 (2010).

### 3.1.2 ECONOMIC CHARACTERISTICS

In both 1989 and 1999, the median household income in the demographic area was higher than any of the other areas analyzed (Table 3-2). Correspondingly, the demographic area had a lower percentage of individuals below the poverty level in 1989 and 1999. This data is not available at the US Census Block Group level for 2012.

New Hanover County, Pender County and the City of Wilmington all rely heavily on tourism. The region consists of many coastal communities enjoyed largely by seasonal residents and visitors. Wilmington has a rich history and substantial cultural resources which make it a popular destination for visitors.

Table 3-2. Income and Poverty Status

Jurisdiction	Median Household Income			Percent Individuals Below Poverty Level		
	1989	1999	2012	1989	1999	2012
<b>North Carolina</b>	\$26,647	\$39,184	\$46,450	12.50%	12.30%	16.8%
<b>New Hanover County</b>	\$27,320	\$40,172	\$50,420	14.0%	13.1%	16.0%
<b>Pender County</b>	\$23,270	\$35,902	\$44,071	17.2%	13.6%	18.0%
<b>Wilmington</b>	\$20,609	\$31,099	\$41,428	22.1%	19.6%	22.9%
<b>Demographic Area</b>	\$34,883	\$46,106	N/A <sup>1</sup>	7.0%	9.3%	N/A <sup>1</sup>

<sup>1</sup>This data is no longer collected at the same geography (block groups) as in previous decennial census surveys. US Census Bureau. 2014. DP03. Selected Economic Characteristics. 2008-2012 5-Year Estimates. <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>

Wilmington is home to a North Carolina Ports Authority complex that is designated as a foreign trade zone. The City also has inland transportation facilities such as CSX Intermodal and Norfolk Southern rail freight services. With major distribution services available, many manufacturing facilities have located in this area.

The Service-Providing Sector was the dominant industry sector for employment in New Hanover County in 2012, representing over 44 percent of total employment in the county. The next largest industry sectors for employment in New Hanover County in 2012 were Education and Health Services (12.5 percent) and Trade Transportation & Utilities (10.2 percent). Service-Providing was also the largest industry sector for employment in Pender County in 2012, representing 40 percent of total employment in the county. Other strong sectors in Pender County in 2012 included Education and Health Services (12.7 percent), Goods-Producing (10.0 percent), and Trade Transportation & Utilities (9.9 percent). Between 2002 and 2012, overall employment increased by almost 10 percent in New Hanover County and by over 4 percent in Pender County.

There are no large employers within the demographic area. Most employers consist of small businesses such as retail establishments and offices. Most residents within the demographic area travel outside of the area to work at large employers such as New Hanover Regional Medical Center, Corning, Verizon, the University of North Carolina at Wilmington, PPD (Pharmaceutical Product Development), and others.

### **3.1.3 COMMUNITY FACILITIES AND SERVICES**

There are a number of noteworthy public facilities within the study area:

- The Topsail Schools complex (Topsail High School, Middle School, and Elementary School) is located off of US 17 near the northern end of the proposed project.
- South Topsail Elementary School is located on Hoover Road.
- Daycare facilities are located on Gordon Road and US 17 in New Hanover County and on NC 210 and US 17 in Pender County.
- Ogden Park is the only park within the study area. This 160-acre facility includes fields for baseball, softball, and soccer, tennis courts, playgrounds, and restroom facilities, among other amenities.
- There are several nearby golf courses located within residential developments in Pender County.
- The 49,000-acre Holly Shelter Game Land is located immediately north of the study area.
- The Hampstead Branch of the Pender County Library is located off of US 17 north of Country Club Drive.
- A North Carolina Highway Patrol station/Division of Motor Vehicles license office is located near the Market Street/Gordon Road intersection in New Hanover County. Hampstead Fire Department and Pender Fire & EMS Rescue are located on US 17 between Hoover Road and Country Club Drive.
- There are several churches and cemeteries located within the study area.
- A groundwater nanofiltration water treatment plant operated by the Cape Fear Public Utility Authority (CFPUA) is located just north of Torchwood Boulevard.
- A wastewater treatment package plant is located at the northeast corner of the Topsail Schools complex. Pender County leases the wastewater treatment facility property to the Board of Education for operation of the Topsail Schools.
- A Pender County recycling center and water tower are located along US 17 adjacent to the Topsail Schools complex.
- A portion of NC Bike Route 3 is located within the project study area running north-northeast from Wilmington to Hampstead along Holly Shelter Road and NC 210. NC Bike Route 3 ties into US 17 at Hampstead and continues north through Pender County. Military Cutoff Road is included as part of the Soundside Route identified as Bike Route 11. An existing multi-use path is located along the eastern side of Military Cutoff Road to the south of Gordon Road, just outside of the study area.

### **3.1.4 COMMUNITY COHESION**

In the southern portion of the study area there is a mix of dense commercial and residential development along Market Street, Military Cutoff Road, and Gordon Road. There is a large residential area comprised of several neighborhoods north of Ogden Park. With the exception of Island Creek Estates, a single-family residential neighborhood located off of Sidbury Road, there is minimal development north of the US 17 Wilmington Bypass to the New Hanover County line.

Hampstead is an unincorporated community in Pender County that includes several retail centers, residential areas, and open space in the vicinity of NC 210 from the Atlantic Intracoastal Waterway to north of US 17. Proximity to numerous coastal communities makes this area a popular second-home and retirement destination. The Hampstead area is home to four golf courses which are centered in large residential developments, including Castle Bay off of Hoover Road, Olde Point off of Country Club Drive, Belvedere off of Long Leaf Drive, and Topsail Greens on Topsail Greens Drive just north of Sloop Point Loop Road.

NC 210 provides access to several low-density residential neighborhoods, including two mobile home communities. A large single-family residential development, Cross Creek, is also located off of NC 210. Low-density single family residential development is located along Harrison Creek Road, Godfrey Creek Road, Hoover Road, and St. John's Church Road.

## **3.2 LAND USE AND TRANSPORTATION PLANNING**

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### **3.2.1 LAND USE PLANS**

Local jurisdictions within the study area include New Hanover County, Pender County, and the City of Wilmington.

#### **3.2.1.1 EXISTING LAND USE**

The southern extent of the study area is characterized primarily by a mix of dense commercial and residential development. From the Wilmington Bypass to NC 210, the intensity of development along US 17 decreases. However, in Hampstead, from NC 210 to the northern end of the study area, land adjacent to US 17 is moderately to heavily developed with commercial and institutional uses. In this area, US 17 provides access to several residential developments.

With the exception of properties near US 17, land use north of the Wilmington Bypass is predominantly rural in nature and includes preserved land, undeveloped forests, open fields, and wetlands. A mix of single family residential and business land uses are located along NC 210. There is limited residential land use on Sidbury Road, Harrison Creek Road, and Hoover Road.

### **3.2.1.2 ZONING CHARACTERISTICS**

Zoning regulations are in place for the Military Cutoff Road Extension and Hampstead Bypass study area in both New Hanover and Pender Counties. Generalized zoning categories combining similar classifications are shown on Figure 22. Land in the New Hanover County portion of the study area is largely zoned for low-density residential uses (R-15). Along Market Street, in addition to residential zoning, there are areas zoned commercial, office and institutional, and industrial. Zoning along the Northeast Cape Fear River, in the northwestern portion of the study area, is largely industrial.

Land in the Pender County portion of the study area is predominantly zoned Rural Agriculture (RA), Residential District-20 (R-20), and Planned Development. RA zoning is defined to accommodate very low-density residential development, and non-residential development not requiring urban services. R-20 zoning is defined to accommodate low-density residential uses.

### **3.2.1.3 FUTURE LAND USE**

The City of Wilmington developed *Choices, The Wilmington Future Land Use Plan, 2004-2025* to guide physical development within the City and to determine how to build or preserve certain aspects of the community. The plan has a long-range planning horizon of twenty years. The plan notes that Wilmington is nearing build-out and there is a need to redevelop aging or underutilized properties. A small part of the study area is included in this plan's boundaries. A few areas along Market Street south of Military Cutoff Road are classified as small infill tracts in Varied Use Areas. This area of Market Street is mostly a Tier Two Redevelopment Area. These areas are characterized by declining or marginal commercial enterprises and/or businesses that have not kept pace with more recent trends. Tier 2 properties are targeted for upgrade as opportunities arise.

The *Market Street Corridor Study* (July 2010) includes a long-term view on development along the Market Street corridor that is defined by efficient land use patterns, transportation choices, distinctive architecture, and high quality of life. Plans for redevelopment of areas around Military Cutoff Road are premised on the proposed Military Cutoff Road Extension. The design intent for this area is to create a compact neighborhood center with a walkable street network and neighborhood services. The Study presents the opinion that the Military Cutoff Road Extension intersection with Market Street should be grade-separated.

Both New Hanover and Pender Counties participate in the cooperative state-local North Carolina Coastal Area Management Act (CAMA) program. CAMA requires local governments within the 20 coastal counties to prepare land use plans that provide a balance of protection, preservation, and orderly development.

The *Wilmington-New Hanover County Joint Coastal Area Management Plan 2006 Update* functions as the future plan for both the City of Wilmington and New Hanover County. The future land use for the New Hanover County portion of the Military Cutoff Road Extension and Hampstead Bypass study area is identified as Wetland Resource

Protection Area, Rural, and Conservation Areas (primarily flood prone). According to the plan document, the Rural classification is comprised of low intensity land uses (agriculture, forest) and discourages urban-type uses. Only low density residential development (less than 2.5 units per acre) is permitted in the Rural area.

New Hanover County does not have a separate land use plan outside of the *Wilmington-New Hanover County Joint Coastal Area Management Plan 2006 Update*. Small area plans exist for the Middle Sound and Porters Neck communities. However, New Hanover County considers these plans outdated as they are more than 20 years old.

The *Pender County CAMA Land Use Plan 2005 Update* focuses on policies designed to protect significant and irreplaceable natural systems. It includes a land use classification system as a tool to protect natural systems, but does not provide detailed guidance for land use decisions. In the CAMA plan, future land use for the Pender County portion of the study area is identified as an Urban Growth Area and Conservation Area. The Urban Growth Area classification provides for the continued development of areas provided with water and/or sewer services or where the County is actively engaged in planning these services. This area classification provides for higher net densities. The Conservation Area Classification is intended to protect natural systems from inappropriate development. The CAMA Land Use Plan shows Conservation Areas along Harrisons Creek, Godfrey Creek, and tributaries to Harrisons Creek, Godfrey Creek, and Island Creek.

The June 2010 *Pender County Comprehensive Land Use Plan* includes future land use classifications that are intended to reflect and expand on the land use classifications used in the CAMA Land Use Plan. The comprehensive plan incorporates a *Coastal Pender Small Area Plan* that includes the study area from the Pender County line near Sidbury Road to Holly Shelter Game Land and Sloop Point Loop Road. The small area plan designates a Mixed-Use future land use classification from Sidbury Road to near Harrison Creek Road, between NC 210 and US 17. The Mixed-Use classification applies to locations where a mix of higher density uses is to be encouraged. The Mixed-Use classification continues along US 17 to Sloop Point Loop Road, with the exception of a few areas classified as Conservation. Conservation areas have special significance or unique characteristics that make them worthy of preservation. These areas include South Topsail Elementary School, the Topsail Schools complex, and Holly Shelter Game Land. Northwest of US 17, from Harrison Creek Road to Holly Shelter Game Land, the future land use classification is predominantly Suburban Growth. The Suburban Growth classification identifies areas where significant residential growth is expected to occur. The *Coastal Pender Small Area Plan* indicates regulations should be revised to protect the Hampstead Bypass Corridor from future development and to encourage development that is in harmony with the bypass when a corridor alternative is selected.

Four notable projects are being planned, or are already under construction, within the New Hanover County portion of the study area:

- A Walmart Shopping Center is currently under construction on Market Street in the Porters Neck area. It will be a 250,000-square-foot shopping center, anchored by a Super Walmart.
- The Reserve at West Bay (formerly West Berkley at West Bay) is proposed as a 217-unit residential development on Torchwood Boulevard. The development was previously approved for 241 units. The revised plans have been preliminarily approved by New Hanover County.
- Maple Ridge, a 47-lot residential development proposed in the vicinity of Military Cutoff Road Extension, was approved by the New Hanover County Board of Commissioners in September 2013.
- Hanover Reserve, a proposed 86-lot residential development near the eastern end of Murrayville Road, received preliminary site plan approval in June 2013.

The DEIS noted four large mixed-use developments were proposed in the Pender County portion of the study area: East Haven, Bayberry Farms, Hampstead Commons, and Hawksbill Cove. The status of these plans is as follows:

- Hawksbill Cove is a proposed 376-acre development located along Country Club Road that would extend from the Atlantic Intracoastal Waterway to existing US 17. The Hawksbill Cove development has received master plan and Phase I approval from the Pender County Planning Board. Access to Hawksbill Cove is proposed from existing US 17 via Country Club Road and Leeward Lane. Revisions to the master plan that include access to the development from Transfer Station Road are pending. The proposed mixed-use development includes 710 single-family residences, 395 multi-family units, and commercial, office, and retail space. The master plan and Phase I approval is valid through October 2, 2014.
- The proposed East Haven development master plan and Phase I approval expired November 2013. Planners with Pender County indicate a new plan submittal for a large mixed-use development on this tract is anticipated in 2014.
- The proposed Bayberry Farms mixed-use development master plan and Phase I approval has expired. Pender County has not received a new submission from the Jamestown Pender development group as of March 2014.
- NCDOT purchased the property associated with the proposed Hampstead Commons development as a protective purchase and to potentially offset project effects on red-cockaded woodpecker foraging habitat. Access for this property would have been acquired by the project.

### **3.2.2 TRANSPORTATION PLANS**

#### **3.2.2.1 HIGHWAY PLANS**

There are several local transportation plans that include portions of the study area:



- The *US 17/NC 210 Corridor Study* (March 2012) was commissioned by NCDOT, the Wilmington MPO, and the NC Board of Transportation to identify near-term strategies to address safety and mobility deficiencies on US 17 and NC 210 in the Hampstead area. In developing its recommendations, the study assumes the completion of 2012-2018 STIP projects within the study area. The draft Preferred Access Plan recommended by the study for US 17 and NC 210 in the Hampstead area shows the US 17 Hampstead Bypass as a component of the Plan. A primary recommendation of the Plan is to convert US 17 through Hampstead to a median-divided facility with superstreet configurations at key intersections.
- The *Draft Pender County Comprehensive Transportation Plan* (July 2012) is intended to serve as a policy document for all future transportation needs and recommendations in Pender County. It includes the towns of Atkinson, Burgaw, St. Helena, and Watha. The long-range plan covers transportation needs through 2040.
- The *Cape Fear Commutes 2035 Transportation Plan, Final Report* (December 2010) notes the proposed Military Cutoff Road Extension and Hampstead Bypass projects are current roadway projects in the STIP.
- The *Thoroughfare Plan for Pender County, North Carolina* (June 1997) shows the Hampstead Bypass in its list of STIP projects and on its adopted Thoroughfare Plan map (see Figure 23).
- The *Coastal Pender County Collector Street Plan* (May 2007) notes plans for the Hampstead Bypass. The plan notes the opportunity to re-envision the function and appearance of existing US 17 after the construction of the Hampstead Bypass to that of a regional arterial and community main street with a “village boulevard” cross section.
- The *City of Wilmington 20-Year Transportation Needs* (January 2007) discusses Market Street Access Management Improvements. The improvements are scheduled between Colonial Drive and Porters Neck Road.
- The *Greater Wilmington Urban Area Thoroughfare Plan* (2006) shows Military Cutoff Road and the proposed extension as a major thoroughfare (see Figure 24).
- The *Wilmington Urban Area 2030 Long-Range Transportation Plan* (2005) lists both the Military Cutoff Road Extension and Hampstead Bypass projects as regionally significant in terms of long-term impact on travel patterns in the Greater Wilmington Urban Area.
- The *Transportation Corridor Official Map of Military Cutoff Road Extension* (2005, amended 2011) shows the corridor the City of Wilmington has preserved for the Military Cutoff Road Extension project (see Figures 7A and 7B). A *Transportation Corridor Official Map Project R-3300 Hampstead Bypass* (2011) shows the corridor preserved for the US 17 Hampstead Bypass. Figures 7C and 7D provide an overview of the map. The detailed *Transportation Corridor Official Map Project R-3300 Hampstead Bypass* can be viewed online at [www.wmpo.org/projects.html](http://www.wmpo.org/projects.html).

- The *Market Street Corridor Plan* (2004) provides strategies that will make Market Street less congested and more attractive. The plan notes that Market Street serves as an entrance corridor to downtown and leads to major commercial and service destinations for both City residents and regional shoppers.

There are two other transportation improvement projects included in the 2012-2018 STIP within the study area (Table 3-3). The US 17 Access Management Improvements (U-4902) are expected to reduce delays and improve safety along US 17 between Colonial Drive and SR 1402 (Porters Neck Road). Other recent improvements to Military Cutoff Road, Market Street, and US 17 were implemented to reduce delays, improve access, and address safety concerns. These include improvements implemented as part of a new shopping center development at Market Street and Porters Neck Road. Future no-build traffic projections and traffic capacity analyses performed for the subject project assumed these other projects were constructed.

Table 3-3. NCDOT 2012-2018 STIP Projects within the Study Area

STIP Project	Description	Schedule (In draft 2013-2023 Program and Resource Plan)
U-3831	SR 2048 (Gordon Road), NC 132 Interchange Ramp to West of US 17 Business (Market Street) – Widen to multi-lanes (2.4 miles). Section A is from the NC 132 interchange ramp to SR 2270 (Wood Sorrell Road). Section B is from Wood Sorrell Road to west of Market Street.	Section A is scheduled for planning and environmental study only. Section B is unfunded.
U-4902	US 17, Colonial Drive to SR 1402 (Porters Neck Road) – Access Management Improvements (8.6 miles). Section A is from SR 1272 (New Centre Drive) to Martin Luther King, Jr. Boulevard. Section B is from Colonial Drive to SR 1272 (New Centre Drive). Section C is from Martin Luther King, Jr. Boulevard to SR 1409 (Military Cutoff Road). Section D is from Military Cutoff Road to SR 1402 (Porters Neck Road).	Section A is complete. All other sections are unfunded.

In addition, a feasibility study (FS-0803B) is underway to evaluate adding additional lanes to existing US 17 from the US 17 Wilmington Bypass in New Hanover County to NC 50 in Onslow County. No funding for right-of-way acquisition or construction is included in the 2012-2018 STIP or draft 2013-2023 Program and Resource Plan for this work. The additional lanes and access management improvements are being studied in an effort to improve safety along US 17. Traffic volumes are expected to exceed the capacity of existing US 17, even with other planned improvements, including the Hampstead Bypass.

### **3.2.2.2 NC STRATEGIC HIGHWAY CORRIDORS**

The Strategic Highway Corridors (SHC) initiative is a major implementation step of the North Carolina Long-Range Multimodal Statewide Transportation Plan adopted by the Board of Transportation in September 2004. Under this initiative, NCDOT is focusing on improving, protecting, and planning for critical highway facilities in the State. Corridors were selected based on meeting one or more of the following criteria:

- *Mobility:* Whether a corridor currently serves or has the potential to expeditiously move large volumes of traffic.
- *Connectivity:* Whether a corridor provides a vital connection between Activity Centers.
- *Interstate Reliever:* Whether a corridor currently serves or has the potential to serve as a reliever route to an existing interstate facility.

The following elements were also considered during Strategic Highway Corridor selection:

- *Hurricane Evacuation Route:* Whether a corridor is considered a major route on the NC Emergency Management's Coastal Evacuation Route Map.
- *Cited in a Prominent Report:* Certain reports list the need for improvements along major corridors in the State, mainly to improve economic conditions in a particular area.
- *Part of a Major Highway System:* Whether a corridor is part of a national, statewide, economic, or military highway system.

The proposed Military Cutoff Road Extension and US 17 within the study area are part of SHC No. 52 between Wilmington and Norfolk, Virginia. In the SHC Vision Plan, US 17 (from I-140 to the Virginia state line) is designated as a freeway facility. The functional purpose of the freeway facility is high mobility and low access. Proposed Military Cutoff Road Extension is designated as a boulevard in the SHC Vision Plan. The functional purpose of the boulevard facility is moderate mobility and low to moderate access.

### **3.2.2.3 TRANSIT PLANS**

The Cape Fear Public Transportation Authority (Wave Transit) provides transit services in Wilmington, most of New Hanover County, and portions of Brunswick County. Through Wave Transit a variety of public transportation options are available, including fixed bus routes, paratransit vans, the Front Street free trolley (serving downtown Wilmington), Seahawk shuttle (serving the University of North Carolina Wilmington [UNC-W] campus), Castle Hayne shuttle, Brunswick Connector, and Columbus Connector. The Wave Transit Northeast Route travels along Gordon Road, crossing Market Street and continuing on Military Cutoff Road south of the study area. Intercity bus services are provided by Greyhound Bus Lines and Carolina Trailways.

The *Wave Short-Range Transit Plan, Final Report* (June 2012) includes New Hanover County and northeast portions of Brunswick County. The purpose of the plan is to identify service needs and opportunities, review existing service performance and productivity, make recommendations for service improvements, and note the financial and capital plan for implementation of recommendations. The plan recommends an updated transit service design that generally maintains coverage to existing areas of service while improving understanding of travel routes and reducing travel time. The proposed improvements do not change the current Northeast Route that serves Gordon Road and Military Cutoff Road south of the study area.

The *Cape Fear Commutes 2035 Transportation Plan, Final Report* includes an express bus route between downtown Wilmington and Hampstead and serving Scotts Hill and Porters Neck. Future public transportation needs are also addressed in the *Wilmington Urban Area 2030 Long-Range Transportation Plan*.

Pender County does not currently have public transit operations in place. Pender Adult Services, Inc., (PAS) operates the Pender Transit System, which provides both human service agency sponsored transit services and general public transportation services.

The study area is not currently served by passenger rail service. There is one inactive railroad within the study area and one active railroad in the project vicinity. The inactive line extends from Craven County to northern Brunswick County and parallels existing US 17 within the study area. The active line is operated by CSX and extends from the North Carolina-Virginia state line in Northampton County southward to Wilmington, offering freight services only.

#### **3.2.2.4 BICYCLE/PEDESTRIAN PLANS**

The *Comprehensive Greenway Plan* (January 2013) for Wilmington and New Hanover County was developed to provide a framework for local governments to establish a comprehensive network of greenways throughout Wilmington and New Hanover County. The plan includes an existing conditions analysis, recommendations, prioritization, and design guidelines for on-street and off-road facilities. Within the proposed project study area, several trails are recommended. These are described below with priority shown in parentheses. Trails are categorized as City of Wilmington (COW) or New Hanover County (NHC):

- Military Cutoff Road Trail (13, COW): trail would extend along Military Cutoff Road from Drysdale Drive to Eastwood Road for 0.3 mile.
- Station Road Trail (16, COW): proposed 0.9-mile trail would extend from Noble School Road to Military Cutoff Road.
- Market Street Rail Trail (3, NHC): a 3.8-mile trail that connects Ogden Park and the Military Cutoff Road Trail with northeast neighborhoods and shopping in the Porters Neck area. Ranked as the number 3 priority within New Hanover County.

- Ogden Park Connector Trail (10, NHC): this 1.3-mile trail would connect Ogden Park to the Eastern Rail Trail.
- I-140 East Trail (18, NHC): trail would extend from Murrayville Road to Market Street for a distance of approximately 6.8 miles.
- Pender Connector Trail (25, NHC): trail would extend from the Ogden Park Connector Trail to the county line for a distance of approximately 8.4 miles.
- Porters Neck Road Connector (26, NHC): 6-mile trail proposed along Porters Neck Road.

In addition, intersection improvements (where trails would intersect with roadways) are proposed at Military Cutoff Road and Market Street, Market Street and Middle Sound Loop Road, Market Street and Bayshore Drive, and Market Street and Porters Neck Road.

The North Carolina Division of Bicycle and Pedestrian Transportation has designated a cross-state system of bicycling highways. One of these designated bicycle highways, NC Bike Route 3, runs through New Hanover and Pender Counties. Within the study area, NC Bike Route 3 runs north-northeast from Wilmington to Hampstead along Holly Shelter Road and NC 210, tying into US 17 at Hampstead and continuing north through Pender County.

In an effort to plan and implement missing portions of the region's bicycle system, the Bicycle System Element program was included as part of the 2006 *Greater Wilmington Urban Area Thoroughfare Plan*. Components include a regional bicycle system which provides a coordinated network of bicycle facilities on locally-owned streets and state-owned roads. This regional system is intended to accommodate longer distance bicycle trips and provide access to regional activity centers. Providing bike paths on Military Cutoff Road and on Eastwood Road from Military Cutoff Road to the Atlantic Intracoastal Waterway are considered high priorities under the Bicycle System Element program. A local bicycle system consisting of collector and local service facilities and neighborhood routes would also provide access to Wave Transit routes.

The Wilmington MPO created a Bicycle and Pedestrian Advisory Committee in April 2007. The "WMPO BikePed Committee" advises the MPO's Transportation Advisory Committee on issues regarding bicycle and pedestrian programs, projects, policies, and safety. The February, 2008 WMPO BikePed Committee Bicycle Routes Map includes Military Cutoff Road to the south of Covil Farm Road as part of Unsigned Bicycle Route 11. This bicycle route, called the Soundside Route, is an 18-mile-long route connecting the Middle Sound Area (near Ogden) to Carolina Beach Road.

The Wilmington Metropolitan Area Bicycle Map was published in March 2007 and updated in 2012 by the City of Wilmington, New Hanover County, and the Wilmington MPO's Bicycle Advisory Committee. The map shows the completed shared-use path along the eastern side of Military Cutoff Road to the south of Gordon Road, and identifies this path as a Suggested Bike Route.

The *US 17/NC 210 Corridor Study* (March 2012) recommends a multi-use path on both sides of existing US 17 in Hampstead. The study does not recommend sidewalks because of high construction and right-of-way costs. However, it suggests revisiting this decision once final designs are determined for the US 17 Hampstead Bypass and the need for long-term improvements along existing US 17 in Hampstead have been identified.

The *Coastal Pender County Collector Street Plan* (May 2007) notes the lack of existing bicycle and pedestrian facilities in the Pender County portion of the study area.

The *Cape Fear Commutes 2035 Transportation Plan, Final Report* notes plans for several facilities within the study area, including: a multi-use path along Military Cutoff Road Extension; future bicycle improvements along several roadways including Sidbury Road, NC 210, and Hoover Road; the East Coast Greenway Coastal Corridor, which is proposed to follow Military Cutoff Road Extension and the Hampstead Bypass; and the Coastal Pender Greenway along the Progress Energy Company's transmission line right-of-way, between NC 210 and Sloop Point Loop Road.

The 2010 *Pender County Comprehensive Parks and Recreation Master Plan* includes recommendations for several bicycle/pedestrian facilities within the study area, including: the Coastal Pender Greenway; and the Coastal Pender Rail-Trail, which would use the former rail corridor along US 17 in Pender County. The Plan also recommends the development of a comprehensive bicycle and pedestrian plan, which would incorporate the bicycle facilities recommended by the Wilmington MPO in the *Cape Fear Commutes 2035 Transportation Plan, Final Report*.

The primary goal of the Pedestrian Element of the 2006 *Greater Wilmington Urban Area Thoroughfare Plan* is to create a continuous network of safe, convenient, and accessible pedestrian facilities to and within regional activity centers and major transit facilities. A number of action items are listed, including incorporating pedestrian plans in the Transportation Capital Improvement Program and implementing sidewalks as part of all transportation improvements, when feasible.

*Walk Wilmington: A Comprehensive Pedestrian Plan* presents a comprehensive pedestrian plan for the City of Wilmington and was partly funded through a grant from NCDOT. The Plan was adopted by the Wilmington City Council on August 4, 2009.

The Gary Shell Cross-City Trail is a primarily off-road, multi-use trail which will provide bicycle and pedestrian access to numerous destinations in Wilmington. Several sections of the trail are complete, including along Eastwood Road just south of the study area. The trail is a public-private venture that will be part of the East Coast Greenway, a multi-use path extending from Maine to Florida. None of the Cross-City Trail will be located within the project study area. However, the existing multi-use path along Military Cutoff Road will provide a future connection.

### **3.3 PHYSICAL ENVIRONMENT CHARACTERISTICS**

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#### **3.3.1 NOISE CHARACTERISTICS**

Noise is basically defined as unwanted sound. It is emitted from many sources including airplanes, factories, railroads, power generation plants, and highway vehicles. Highway noise, or traffic noise, is usually a composite of noises from engine exhaust, drivetrain, and tire-roadway interaction.

The magnitude of noise is usually described by its sound pressure. Since the range of sound pressure varies greatly, a logarithmic scale is used to relate sound pressures to some common reference level, usually the decibel (dB). Sound pressures described in decibels are called sound pressure levels and are often defined in terms of frequency-weighted scales (A, B, C, or D). The weighted-A decibel scale is used almost exclusively in vehicle noise measurements because it places the most emphasis on the frequency range to which the human ear is most sensitive (1,000-6,000 Hertz). Sound levels measured using a weighted-A decibel scale are often expressed as dBA. Examples of noise pressure levels in dBA are a jackhammer at 120 dBA, a garbage disposal at 80 dBA, a window air-conditioner at 60 dBA, and a dripping faucet at 30 dBA.

Noise measurements were taken in the vicinity of the project to determine ambient (existing) noise levels. This project is primarily on new location; therefore, ambient measurements were taken in locations that were in close proximity to the study corridors. The purpose of this noise level information was to quantify the existing acoustic environment and to provide a base for assessing the impact of future noise level increases. The measured current noise levels within the study area ranged from 53 dBA to 73 dBA.

#### **3.3.2 AIR QUALITY**

Air pollution originates from various sources. Emissions from industry and internal combustion engines are the most prevalent sources. The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These standards were established to protect the public from known or anticipated effects of air pollutants. The most recent amendments to the NAAQS contain criteria for sulfur dioxide (SO<sub>2</sub>), particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and lead (Pb).

The primary pollutants from motor vehicles are unburned hydrocarbons, nitrous oxides, carbon monoxide, and particulates. Hydrocarbons and nitrogen oxides can combine in a complex series of reactions catalyzed by sunlight to produce photochemical oxidants such as ozone and NO<sub>2</sub>. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources.

A project-level qualitative air quality analysis was prepared for this project. A copy of the unabridged version of the full technical report titled *Air Quality Analysis* (July 2009) can

be viewed at the Project Development & Environmental Analysis Unit, Century Center Building A, 1000 Birch Ridge Drive, Raleigh. The results of this analysis are presented in Section 4.3.2 of this FEIS.

The project is located in New Hanover and Pender Counties, which have been determined to comply with the NAAQS. The proposed project is located in an attainment area; therefore, 40 CFR 51 and 93 are not applicable.

### 3.3.3 FARMLANDS

North Carolina Executive Order Number 96, *Conservation of Prime Agricultural and Forest Lands*, requires all state agencies to consider the impact of land acquisition and construction projects on prime farmland soils, as defined by the Farmland Protection Policy Act of 1981 (FPPA). Prime farmland is determined by soil type as defined by the Natural Resources Conservation Service (NRCS). Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural products within allowable soil erosion tolerance. Prime farmland does not include land already in or committed to urban development, transportation or water storage. Table 3-4 shows prime farmland soils within the study area. Soils within the study area are included on Figure 25.

Table 3-4. Prime Farmland Soils within the Study Area

Soil Series	Mapping Unit	County
Craven fine sandy loam	Cr	New Hanover
Johns fine sandy loam*	Jo	Pender
Lynchburg fine sandy loam*	Ls	New Hanover
Norfolk loamy fine sand	NoB	Pender
Onslow loamy fine sand	On	New Hanover/Pender
Pantego loam*	Pn	New Hanover
Rains fine sandy loam*	Ra	New Hanover/Pender
Torhunta mucky fine sandy loam*	To	New Hanover/Pender
Woodington fine sandy loam*	Wo	New Hanover/Pender
Wrightsboro fine sandy loam	Wr	New Hanover

\*Prime farmland if drained.

Pender County adopted a Voluntary Farmland Preservation Program Ordinance in December 2010. This ordinance provides for the creation of Voluntary Agricultural Districts (VADs). As of February 2014, no properties have received the VAD



designation. However, Pender County plans to accept applications from property owners who would like their land designated as a VAD in the near future (Pender County, personal communication). New Hanover County does not have a VAD program.

There were 37 Agriculture, Forestry, Fishing and Hunting related businesses in Pender County in 2012. These operations accounted for approximately 3.5 percent of total industry in the County and provided employment for approximately 2.5 percent of the total working population. Information from the Pender County Cooperative Extension office indicates the agriculture and timber industry in Pender County ranked 17<sup>th</sup> in North Carolina compared to other counties and produced approximately \$162 million in revenue in 2012. This revenue was largely driven by livestock production (\$118 million), with crop (corn, soy and wheat) production contributing approximately \$43 million and supporting the livestock industry. Approximately 322,900 acres are zoned 'Rural Agriculture' in Pender County. These areas are predominantly located in the western part of the County. Of the approximately 322,900 acres zoned 'Rural Agriculture', approximately 112 acres are located within the project area. New Hanover County ranked 96<sup>th</sup> in North Carolina compared to other counties and produced approximately \$4 million in revenue in 2012. Most production is in "nursery, greenhouse, floriculture, and Christmas trees" at approximately \$3.4 million.

### **3.3.4 UTILITIES**

Water and wastewater services in Wilmington and New Hanover County are provided by the Cape Fear Public Utilities Authority (CFPUA). Sewer lines and water lines extend along Market Street, US 17, Sidbury Road, and Military Cutoff Road. Mapping provided by CFPUA shows numerous existing and proposed well sites and associated water lines within the project area associated with their groundwater nanofiltration water treatment plant located just north of Torchwood Boulevard. The CFPUA well sites and water treatment plant are discussed in more detail in Sections 3.5.3.1.1 and 4.5.3.1.1.

Pender County Utilities and private utility companies provide water and wastewater services in Pender County. Existing sewer and water lines are present along US 17, NC 210, and Hoover Road. A wastewater treatment package plant is located at the northeast corner of the Topsail Schools complex. The Pender County Board of Education leases the wastewater treatment facility property from Pender County for use by the Topsail Schools. Pender County plans to expand sewer services in the area of the schools; however, funding availability makes the timing of improvements uncertain.

Other utilities vary in density from light to heavy with fiber optic, telephone, underground telephone, power, and cable TV in residential areas and along Market Street. A natural gas line runs along Market Street. There are fiber optic, telephone, and water lines located along US 17. One of AT&T's main fiber optic lines on the east coast runs along the west side of US 17 and along an abandoned railroad right-of-way. There is a Pender County water tower located along US 17 adjacent to the Topsail Schools complex.

There are power line easements near Ogden Park and in the northwestern portion of the study area south of Island Creek Road. Power substations are located northeast of the intersection of Military Cutoff Road and Market Street in New Hanover County and off of St. John's Church Road near Country Club Drive in Pender County.

### **3.3.5 HAZARDOUS MATERIALS**

A geo-environmental impact evaluation was conducted to identify properties within the study area that are, or may be, contaminated and therefore result in increased project costs and future environmental liability if acquired. Hazardous materials are generally defined as material or a combination of materials that present a potential hazard to human health or the environment. Properties of concern include, but are not limited to, properties with active and abandoned underground storage tanks (USTs), hazardous waste sites, regulated landfills, and unregulated dumpsites. The geo-environmental impact evaluation included the following activities to identify known and potential hazardous materials sites within the study area: file searches of appropriate environmental agencies' databases; a review of Geographic Information System (GIS) data; and a field reconnaissance of the study area in February 2009.

No potential Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites were identified within the study area.

The geo-environmental impact evaluation identified a total of 35 known and potential hazardous materials sites within the study area (see Figures 10A through 10K and Figures 16A through 16G), including 28 sites that may contain petroleum USTs and seven sites with other geo-environmental concerns. These seven sites included five automotive repair facilities, one junkyard, and one golf course maintenance shop.

No hazardous waste sites and no landfills were identified within the study area. Table 3-5 lists these 35 known and potential hazardous materials sites, as well as the anticipated level of geo-environmental impact potential for each site. The level of geo-environmental impact potential refers to the potential for future environmental liability if the property is acquired, as well as the anticipated risk of a substantial increase in project costs and/or scheduling associated with affecting the site. Sites with low geo-environmental impact potential are anticipated to have little to no impacts with respect to these issues. All 35 sites listed in Table 3-5 are anticipated to have low geo-environmental impact potential on the proposed project. The discovery of additional sites not recorded by regulatory agencies and not reasonably discernible during the field reconnaissance could occur later in project development.

Table 3-5. Known and Potential Hazardous Materials Sites within the Study Area

Site Name	Address	Status	Geo-Environmental Impact Potential
Capital Lincoln Mercury	5501 Market Street, Wilmington	Currently operates as a car dealership; 2 USTs were removed from the site in 1989.	Low
A-1 Tint Pros	5506 Market Street, Wilmington	Currently operates as an automotive repair shop; 3 USTs at the site were closed in 1990. Ground-water incident (GWI) #13248 was assigned to this site.	Low
Stevens Fabrication and Welding	5506 Market Street, Wilmington	Currently operates as a metal fabrication shop; 2 USTs at this site were closed in 1989.	Low
JS&J Auto	5625 Market Street, Wilmington	Currently operates as an automotive repair shop; there is no information in UST registry on this facility, and no evidence of current USTs at site.	Low
Tony's Auto Service	5663 Market Street, Wilmington	Currently operates as an automotive repair shop; there is no information in UST registry on this facility, and no evidence of current USTs at site. Site has 1 in-ground hydraulic lift in use.	Low
Cape Fear Toyota	5640 Market Street, Wilmington	Currently operates as a car dealership; 1 UST at this site was closed in 1991 and 1 UST was closed in 1993. There is no evidence of current USTs at this site.	Low
Leonard's Building and Truck Accessories	5705 Market Street, Wilmington	Currently operates as a building and truck accessories business; 1 UST at this site was closed in 1980 and 1 UST was closed in 1988. GWI #17117 was assigned to this site.	Low
Make an Offer Auto's	5810 Market Street, Wilmington	Currently operates as a used car lot; 1 UST at this site was closed in 1990. GWI #6096 was assigned to this site.	Low
Parkway Mitsubishi	5924 Market Street, Wilmington	Currently operates as a car dealership; 2 USTs at this site were closed in 1997. GWI #18295 was assigned to this site.	Low
Hertz Equipment Rental	5931 Market Street, Wilmington	Currently operates as an equipment rental facility; there is no evidence of current USTs at this site. There is 1 above-ground storage tank (AST) on the property.	Low

Table 3-5. Known and Potential Hazardous Materials Sites within the Study Area *continued*

Site Name	Address	Status	Geo-Environmental Impact Potential
D&E Dodge	6220 Market Street, Wilmington	Currently operates as a car dealership; 2 USTs at this site were closed in 1988 and 1 waste oil tank closed in place in 1994. There are 2 GWIs (#5132 and #19133) assigned to this site: 1 for a contaminated water supply well (no longer in use) and 1 for the waste oil tank.	Low
Gogas #11	6308 Market Street, Wilmington	Currently operates as a convenience store and gas station; 6 USTs are currently in use at this site.	Low
A to Z Equipment Rental	6312 Market Street, Wilmington	Currently operates as an equipment rental company; 1 UST at this site was closed in 1991. There are no USTs currently in use at this site. GWI #6246 was assigned to this site.	Low
Value Express 1 (Our Corner Store)	6402 Market Street, Wilmington	Currently operates as a convenience store and gas station; 3 USTs at this site were closed in 1994 and 2 USTs are currently in use. GWI #17314 was assigned to this site.	Low
Jackson Motor Co.	6404 Market Street, Wilmington	Currently operates as a used car lot; there is no evidence of current USTs at this site. GWI #14505 was assigned to this site.	Low
Pantry #3122 (Quickstop)	6480 Market Street, Wilmington	Currently operates as a convenience store and gas station; 5 USTs are currently in use at this site.	Low
Kelly's Automotive	6747 Market Street, Wilmington	Currently operates as an automotive repair shop; 1 UST at this site was closed in 1998. There are 2 GWIs (#18650 and #32102) assigned to this site. Site has 1 in-ground hydraulic lift in use.	Low
The Thieves Market	6768 Market Street, Wilmington	Currently operates as an antique shop; there is no evidence of current USTs at this site.	Low
The Used Bookery	6770 Market Street, Wilmington	Currently operates as a used book store; 2 USTs at this site were closed in 1989.	Low
NC Highway Patrol Station	1 Station Road, Wilmington	Currently operates as a Highway Patrol Station; 3 USTs are currently in use at this site.	Low
Walgreens Drug Store	6861 Market Street, Wilmington	Currently operates as a drug store; 5 USTs at this site were closed in 2001. There are no USTs currently in use at this site. GWI #23276 was assigned to this site.	Low

Table 3-5. Known and Potential Hazardous Materials Sites within the Study Area *continued*

Site Name	Address	Status	Geo-Environmental Impact Potential
O'Leary's Auto Repair	6905 Market Street, Wilmington	Currently operates as an automotive repair shop; there are no USTs currently in use at this site.	Low
Pro Lube	6940 Market Street, Wilmington	Currently operates as an oil change facility; there are no USTs currently in use at this site. GWI #17066 was assigned to this site.	Low
Market Street Citgo	6980 Market Street, Wilmington	Currently operates as a convenience store and gas station; 6 USTs are currently in use at this site. There are 2 GWIs (#10148 and #32113) assigned to this site.	Low
Scotchman #35	7158 Market Street, Wilmington	Currently operates as a convenience store and gas station; 2 USTs are currently in use at this site and 4 USTs were removed in 1997. GWI #17287 was assigned to this site.	Low
Gas Center #12	7318 Market Street, Wilmington	Currently operates as a convenience store and gas station; 5 USTs are currently in use at this site.	Low
Wilco #391	7413 Market Street, Wilmington	Currently operates as a convenience store and gas station; 4 USTs are currently in use at this site.	Low
Porters Neck Country Store	7644 Market Street, Wilmington	Currently operates as a convenience store and gas station; 3 USTs are currently in use at this site and 6 USTs were removed in 1988.	Low
Wilco Hess Food Mart #394	14477 US 17, Hampstead	Currently operates as a convenience store and gas station; 3 USTs are currently in use at this site.	Low
Hampstead Country Store	14565 US 17, Hampstead	Currently operates as a convenience store and gas station; 3 USTs are currently in use at this site.	Low
Lucas & Associates Realtors	14695 US 17, Hampstead	Currently operates as a business office; there is no information in UST registry on this facility, and no evidence of current USTs at site, but it may have potentially been a gas station in the past.	Low
Jebby's on 17	15831 US 17, Hampstead	Currently operates as a restaurant and bar; there is no information in UST registry on this facility, and no evidence of current USTs at site, but it may have potentially been a gas station in the past.	Low

Table 3-5. Known and Potential Hazardous Materials Sites within the Study Area *continued*

Site Name	Address	Status	Geo-Environmental Impact Potential
Midway Tire & Battery	16646 US 17, Hampstead	Currently operates as an automotive repair shop; there are no USTs currently in use at this site.	Low
Scotchman #183	1 US 17, Hampstead	Currently operates as a convenience store and gas station; 2 USTs are currently in use at this site and 4 USTs were removed in 1997. GWI #16267 was assigned to this site.	Low
Castle Bay Golf Course Maintenance Shop	2516 Hoover Road, Hampstead	Currently operates as a maintenance and landscaping shop for a golf course; 2 ASTs are located between Hoover Road and the shop, and the shop stores landscaping equipment, fertilizer, herbicides, and pesticides.	Low

### 3.3.6 MINERAL RESOURCES

The North Carolina Department of Environment and Natural Resources, Division of Energy, Mineral and Land Resources, lists four permitted active mines within the study area as of July 18, 2013, but one of these mines (West Bay Pond Mine in New Hanover County) has been closed since the early 2000s and the former site is now part of a residential development. Two of the active sites are permitted for sand and gravel operations and include: Whitehouse Creek Mine in Pender County (see Figure 10G) and HanPen Mine in Pender County (see Figure 10F). Castle Hayne Quarry is located off of Holly Shelter Road near I-40 in New Hanover County.

### 3.3.7 FLOODPLAINS/FLOODWAYS

Both New Hanover County and Pender County participate in the National Flood Insurance Regulatory Program and portions of the study area are within the 100-year floodplain. Figures 10A through 10K and Figures 16A through 16G show floodplains within the study area. There are no Federal Emergency Management Agency (FEMA) buyout properties within the study area.

### 3.3.8 PROTECTED LANDS

#### 3.3.8.1 WILD AND SCENIC RIVERS

No Wild and Scenic Rivers are located within the study area.

### **3.3.8.2 STATE/NATIONAL FORESTS**

No state or national forests are located within the study area.

### **3.3.8.3 GAME LANDS AND PRESERVATION AREAS**

There are several Significant Natural Heritage Areas (SNHAs) or managed preservation areas within the study area. These areas are described below and shown on Figures 10A through 10K and Figures 16A through 16G.

Holly Shelter Game Land is located at the northern end of the study area. The site is managed by the state of North Carolina and is part of a SNHA. At over 50,000 acres, Holly Shelter Game Land is one of the highest quality areas of pocosin habitat and savanna flatwoods remaining on the east coast. Holly Shelter Swamp, one of the largest peat-filled pocosin basins in the southeastern U.S., makes up approximately 75 percent of the game land. The site supports numerous rare species and plants including rough-leaved loosestrife (*Lysimachia asperulaefolia*) and red-cockaded woodpecker (*Picoides borealis*). Red-cockaded woodpecker clusters on Holly Shelter Game Land are part of the Coastal North Carolina Primary Core Recovery Population within the Mid-Atlantic Coastal Plain Recovery Unit Population. The management of the red-cockaded woodpecker is a major function of Holly Shelter Game Land.

Blake Savanna is a SNHA located in Pender County adjacent to Sidbury Road. The site is privately owned. Blake Savanna has a good quality example of a rare Pine Savanna natural community variant.

There are five NCDOT mitigation sites within the study area: Corbett Tract Mitigation Site, Corbett Tract Residual Strip, Plantation Road Mitigation Site, 34-Acre Residual Site, and 22-Acre Residual Site. NCDOT purchased these five sites (a total of 27 parcels) for wetland and threatened and endangered species impact mitigation associated with the US 17 Wilmington Bypass. NCDOT purchased all land at these sites in fee simple and there are no easements on the properties. NCDOT also currently manages each of these sites. All five sites contain wetlands, but only the Corbett Tract Mitigation Site has been used for wetland mitigation and its alteration is prohibited by the USACE's permit for the US 17 Wilmington Bypass. In addition, all five sites contain rough-leaved loosestrife habitat, but only the Corbett Tract and Plantation Road mitigation sites have documented populations at this time. A brief description of each site follows:

- Corbett Tract Mitigation Site – This is an approximately 618-acre wetland mitigation site located along the existing US 17 Wilmington Bypass near the I-40 interchange. It provided 493 acres of wetlands mitigation for impacts related to the construction of the US 17 Wilmington Bypass. In addition to providing wetland mitigation, per the conservation measures in a January 2002 NCDOT Biological Assessment and a May 2002 USFWS Biological Opinion for the US 17 Wilmington Bypass (R-2405A), the Corbett Tract Mitigation Site also is to be maintained as a preservation area for rough-leaved loosestrife.

- Corbett Tract Residual Strip – This is an approximately 28.5-acre buffer strip, or residual strip, that is part of the Corbett Tract Mitigation Site. It is located along US 17 Wilmington Bypass approximately midway between I-40 and Market Street. The Corbett Tract Residual Strip was not used for mitigation; however, per the conservation measures in a January 2002 NCDOT Biological Assessment and a May 2002 USFWS Biological Opinion for the US 17 Wilmington Bypass (R-2405A), it is intended to be maintained as a buffer between the Bypass and adjacent rough-leaved loosestrife clusters.
- Plantation Road Mitigation Site – This site is located adjacent to the eastern end of the Corbett Tract Residual Strip. In addition to being considered for wetland mitigation, per the conservation measures in a January 2002 NCDOT Biological Assessment and a May 2002 USFWS Biological Opinion for the US 17 Wilmington Bypass (R-2405A), the site is also to be maintained as a preservation area for rough-leaved loosestrife.
- 34-Acre Residual Site – This site is located along the north side of the US 17 Wilmington Bypass near the northeastern corner of the Plantation Road Mitigation Site. It was not used directly for conservation measures or mitigation.
- 22-Acre Residual Site – This site is located just west of the US 17 Wilmington Bypass interchange with Market Street. It also was not used directly for conservation measures or mitigation.

There are several other SNHAs and managed areas in the project vicinity. These sites include Sidbury Road Savanna, Castle Bay Preserve, a North Carolina Ecosystem Enhancement Program Site adjacent to Holly Shelter Game Land, and portions of Howe, Pages and Futch creeks.

### **3.4 CULTURAL RESOURCES**

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Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800), requires federal agencies to take into account the effects of their undertaking on historic properties (including archaeological sites) and afford the Advisory Council on Historic Preservation an opportunity to comment on the effects of the undertaking. Since the proposed project does not use funds from the Federal Highway Administration, but requires a federal permit from the US Army Corps of Engineers, USACE will serve as the lead federal agency with respect to compliance with Section 106. The proposed project is not subject to Section 4(f) of the USDOT Act of 1966.

#### **3.4.1 HISTORIC ARCHITECTURAL RESOURCES**

A preliminary architectural survey was conducted in January 2010 and identified a total of 78 individual resources that were built prior to 1961 within the Area of Potential Effects (APE). Of those resources, one is listed on the National Register of Historic Places, and the State Historic Preservation Office (HPO) determined four others are



eligible for listing on the National Register. These resource locations are shown on Figures 10C, 10E, 10G, and 10I. The historic architectural resources in the vicinity of the preferred alternative are shown on Figures 16B and 16F. A preliminary architectural survey of the extended study area for the Lendire Road improvements was conducted in October 2013. The survey did not identify any properties eligible for or listed on the National Register. The HPO concurred with these findings on October 29, 2013.

### **Property Listed on the National Register**

**Poplar Grove** – This property is located on US 17 North, across from Sidbury Road in Pender County.

Poplar Grove was erected circa 1850 for Joseph Mumford Foy, an amateur architect who designed the residence. The antebellum Poplar Grove plantation house was erected to face the New Bern-to-Wilmington plank road that traversed the estate. The Foy plantation contained 64 slaves and produced naval stores, as well as peanuts, beans, corn, and swine for northern markets. After the Civil War, the farm was owned by Joseph T. Foy, an influential landowner, businessman, and politician who was instrumental in linking New Bern to Wilmington by railroad. The property was listed in the National Register in 1979 due to its associations with the prominent Foy family and its architectural integrity.

It is recommended that the National Register Boundary be amended to exclude a new commercial building and its 0.7-acre site, which was subdivided from the original National Register tract along Scotts Hill Loop Road.

### **Properties Eligible for the National Register**

**Mount Ararat AME Church** – This property is located along Market Street and Ogden Park Drive.

Mount Ararat AME Church was constructed in the Middle Sound community of New Hanover County soon after Reconstruction ended. The cornerstone indicates the church was built in 1878, although a 1985 county-wide architectural survey described it as one of five extant buildings that dated to the 1880s. The church is notable for its early use of a projecting entrance tower and pointed arch windows, reflecting the influence of Gothic Revival ecclesiastical architecture. Mount Ararat AME Church is recommended eligible for the National Register under Criterion C for architecture and under Criterion Consideration A: Religious Properties.

**Wesleyan Chapel United Methodist Church** – This property is located at the junction of US 17 North and Sidbury Road.

The 1931 church is a brick-veneered, Colonial Revival edifice with a front-gable main block, frame cupola, and both jack-arched and segmental-arched windows and entrance. A church history states that the interior is largely intact and retains its auditorium plan and original finishes. A church cemetery divided into sections is located behind the church building and contains headstones that date primarily from the late nineteenth

century to recent decades. Wesleyan Chapel United Methodist Church is recommended eligible for the National Register under Criterion C for architecture and under Criterion Consideration A: Religious Properties.

**Scotts Hill Rosenwald School** – This school sits on a 1.71-acre lot facing northwest towards US 17 North in Pender County.

The school was constructed between 1926 and 1927, and is a one-room, frame building with a one-story, front-gable form of German siding, brick foundation piers, and a shed-roofed front entry. Original wood floors, walls, and ceiling appear to have survived. Scotts Rosenwald School is eligible for the National Register under Criterion A for both education and African American heritage and under Criterion C for architecture.

**Topsail Consolidated School** – This school faces west along US 17 North in the Hampstead community of Pender County.

Built in 1925, the vacant school is an expansive, Neo-Classical Revival building that features a prominent, colossal portico capped by a pediment. The school building has replacement one-over-one, wood sash windows throughout, but original brick lintels with soldier courses and cast-stone decorative treatments remain intact. Plaster walls, wood ceilings, and wood-paneled classroom doors also remain intact. Topsail Consolidated School is eligible for the National Register under Criterion A for education and Criterion C for architecture.

### **3.4.2      ARCHAEOLOGICAL RESOURCES**

Due to the number of DEIS detailed study alternatives, an intensive archaeological survey was only conducted within the study corridor for the preferred alternative (Alternative M1+E-H). This archaeological survey of the APE for the preferred alternative was conducted between June 11 and July 5, 2013.

The survey identified nine archaeological sites within the APE. Eight of these sites are recommended ineligible for listing on the National Register. In a memorandum dated October 15, 2013 (see copy in Appendix B), HPO concurred with the recommendation that these eight sites are not eligible for listing on the National Register and that no further archaeological work is necessary, with the exception of any affected cemeteries that may require treatment under the provisions of N.C.G.S 65-13. One historic period site, 31PD344\*\*, was recommended eligible for inclusion on the National Register. This site is a short-term mid- to late-18<sup>th</sup> century domestic site characterized by on-site commercial extraction of local forest products. Because this site is relatively intact and represents a discreet occupation, it has the potential to yield information on the lifestyles of 18<sup>th</sup> century lower socio-economic people not directly associated with the domestic core of the plantation. HPO concurred with the recommendation for National Register eligibility for this site in its October 15, 2013 memorandum.

NCDOT completed an archaeology survey of the extended study area for the Lendire Road improvements in October 2013. No new archaeological sites were identified within the Lendire Road improvements APE.

### **3.4.3 TRIBAL LANDS**

There are no American Indian tribal lands within the project study area.

## **3.5 NATURAL ENVIRONMENT CHARACTERISTICS**

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Field investigations were conducted by qualified biologists between February 14, 2008 and June 23, 2010 to assess the existing natural environment within the study area. Details of the methodology and investigations supporting the information provided in this section are provided in the Natural Resources Technical Report (NRTR) completed in August 2010, appended by reference. As discussed in Section 3.0, extended study areas totaling approximately 25.0 acres were added to the project in April 2012 to account for portions of the preferred alternative corridor that extend outside of the project study area identified in the 2011 DEIS. Corresponding field investigations were conducted by qualified biologists in the extended areas on May 16, 2012. Details of the methodology and investigations for these extended study areas are provided in the Natural Resources Technical Memo completed in September 2012, appended by reference. Extended study areas totaling approximately 46.9 acres also were added to the project in August 2013 to account for portions of three of the potential service roads (SR3, SR8, and SR16) that extend slightly outside of the 2011 DEIS project study area, as well as the proposed Lendire Road improvements. Corresponding field investigations were conducted by qualified biologists in the extended areas on August 20, 2013 and September 6, 2013. Details of the methodology and investigations for these extended study areas are provided in the Natural Resources Technical Memo completed in October 2013, appended by reference. The sections below describing the existing natural environment characteristics within the project study area have been updated since the 2011 DEIS, as needed, to include the features identified in these extended study areas.

### **3.5.1 SOILS/TOPOGRAPHY/GEOLOGY**

A limited geotechnical investigation was completed by NCDOT in December 2008 to evaluate subsurface conditions. The investigation consisted of a field reconnaissance visit and review of existing subsurface data within the study area to determine the suitability of subgrade material and ground water depth.

The proposed project lies within the Coastal Plain Physiographic Province. Topography within the study area is nearly level with numerous creeks bisecting the upland areas. Elevations within the study area range from 10 to 65 feet above mean sea level. Existing US 17 follows an upland ridge. Northwest of US 17, the project lies within the Northeast Cape Fear River drainage basin and surface water flows to the northwest.

Southeast of US 17, surface water flows into Topsail and Middle Sound. Subsurface drainage is typically poorly drained to well drained.

The geology within the study area consists of mostly undivided coastal plain sediments consisting of granular and less abundant cohesive soils. The majority of these soils exhibit excellent to good engineering properties and are suitable for embankment construction.

Northwest of US 17 and north of the developed area of Wilmington, surficial organic soils are present as topsoil and vary from one to three feet thick. Most of the creeks within the study area contain five to 15 feet of organic soils in associated floodplains. Carolina Bays are present within the study area. The bays typically contain organic soils. The organic soils exhibit poor engineering properties.

Limestone of the Eocene age Castle Hayne formation was encountered within the study area near sea level. Sinkholes are present within the study area due to collapse of the limestone layers.

The New Hanover County Soil Survey identifies 20 soil unit types within the New Hanover County portion of the study area. Additionally, the Pender County Soil Survey identifies 17 soil unit types within the Pender County portion of the study area. Table 3-6 below lists the soils series, drainage class, and hydric status for these units.

Table 3-6. Soils within the Study Area

Soil Series	Mapping Unit	Drainage Class	Hydric Status	County
Alpin fine sand	AnB	Excessively Drained	Hydric*	Pender
Autryville fine sand	AuB	Well Drained	Hydric*	Pender
Baymeade fine sand	Be BaB	Well Drained	Hydric*	New Hanover Pender
Craven fine sandy loam <sup>1</sup>	Cr	Moderately Well Drained	Hydric*	New Hanover
Dorovan soils	DO	Very Poorly Drained	Hydric	New Hanover
Foreston loamy fine sand	Fo	Moderately Well Drained	Hydric*	Pender
Johns fine sandy loam <sup>2</sup>	Jo	Somewhat Poorly Drained	Hydric*	Pender
Johnston soils	JO	Very Poorly Drained	Hydric	New Hanover
Kureb sand	Kr KuB	Excessively Drained	Hydric*	New Hanover Pender
Leon sand	Le LnA	Poorly Drained	Hydric	New Hanover Pender
Lynchburg fine sandy loam <sup>2</sup>	Ls	Somewhat Poorly Drained	Hydric*	New Hanover
Lynn Haven fine sand	Ly	Poorly Drained	Hydric	New Hanover
Mandarin fine sand	Ma	Somewhat Poorly Drained	Hydric*	Pender
Marvyn and Craven soils	McC	Moderately/Well Drained	Hydric*	Pender

Table 3-6. Soils within the Study Area *continued*

Soil Series	Mapping Unit	Drainage Class	Hydric Status	County
Muckalee loam	Mk	Poorly Drained	Hydric	Pender
Murville muck	Mu	Very Poorly Drained	Hydric	New Hanover Pender
Norfolk loamy fine sand <sup>1</sup>	NoB	Well Drained	Hydric*	Pender
Onslow loamy fine sand <sup>1</sup>	On	Moderately Well/ Somewhat Poorly Drained	Hydric*	New Hanover Pender
Pactolus fine sand	PaA	Moderately Well/ Somewhat Poorly Drained	Hydric*	Pender
Pantego loam <sup>2</sup>	Pn	Very Poorly Drained	Hydric	New Hanover
Rains fine sandy loam <sup>2</sup>	Ra	Poorly Drained	Hydric	New Hanover Pender
Rimini sand	Rm	Excessively Drained	Hydric*	New Hanover
Seagate fine sand	Se	Somewhat Poorly Drained	Hydric*	New Hanover
Stallings fine sand	St	Somewhat Poorly Drained	Hydric*	New Hanover
Torhunta mucky fine sandy loam <sup>2</sup>	To	Very Poorly Drained	Hydric	New Hanover Pender
Urban land	Ur	None	Nonhydric	New Hanover
Wakulla sand	Wa	Somewhat Excessively Drained	Nonhydric	New Hanover
Woodington fine sandy loam <sup>2</sup>	Wo	Poorly Drained	Hydric	New Hanover Pender
Wrightsboro fine sandy loam <sup>1</sup>	Wr	Moderately Well Drained	Nonhydric	New Hanover

\*Soils which are primarily nonhydric, but which contain hydric inclusions.

<sup>1</sup>All areas are prime farmland. <sup>2</sup>Prime farmland if drained.

### 3.5.2 BIOTIC COMMUNITIES AND WILDLIFE

Biotic resources within the study area include both terrestrial and aquatic communities. The composition of these communities is reflective of the topography, soils, hydrologic influences, and past and present land uses. The following sections describe the existing vegetation and associated wildlife that have been identified within the study area.

#### 3.5.2.1 TERRESTRIAL COMMUNITIES AND WILDLIFE

##### 3.5.2.1.1 TERRESTRIAL COMMUNITIES

Fifteen terrestrial communities were identified within the study area. Figures 26A through 26K show the location and extent of these terrestrial communities. Table 3-7 summarizes the terrestrial community coverage within the study area. The terrestrial community coverage within the study area increased by 71.9 acres since the DEIS as a result of the extended study areas discussed in Section 3.5. There were no new terrestrial communities identified in the extended study areas. Most of the increase (58.5 acres) was to the maintained/disturbed community. The study area for the Lendire Road

improvements is located in a heavily developed area along the Market Street corridor, and the entire 35.9-acre study area is classified as maintained/disturbed.

Table 3-7. Coverage of Terrestrial Communities within the Study Area

Community	Coverage (acres)
Maintained/Disturbed	3,000.9
Mesic Pine Flatwoods	1,637.5
Wet Pine Flatwoods	850.3
Pond Pine Woodland	820.8
Pocosin	517.8
Xeric Sandhill Scrub	359.5
Coastal Plain Bottomland Hardwood - Blackwater Subtype	288.8
Nonriverine Wet Hardwood Forest	265.0
Pine Savanna	192.4
Cutover	176.1
Coastal Plain Small Stream Swamp - Blackwater Subtype	162.6
Cypress/Gum Swamp - Blackwater Subtype	140.5
Nonriverine Swamp Forest	58.3
Small Depression Pocosin	20.0
Small Depression Pond	4.3
<b>TOTAL</b>	<b>8,494.8</b>

### Maintained/Disturbed

This community consists of areas that are periodically maintained by human influences, such as roadside and power line rights-of-way, regularly mowed lawns, commercial and industrial properties, and open areas. All of these land uses tend to have similar vegetation, with few large trees and abundant herbaceous cover. The tree species observed within the study area include loblolly pine, red maple, sweet-gum, live oak, black cherry, white oak, and longleaf pine; however, residential properties tended to have a wide range of large tree species. Two common shrubs to this vegetative sub-type, observed occurring both naturally and as escaped plants, are wild and cultivated roses and wax myrtle. Fescue is the dominant groundcover species throughout most of these areas. Other groundcover and herbaceous species included goldenrod, broomsedge, dog-fennel, Bermuda grass, and Japanese honeysuckle.

### **Mesic Pine Flatwoods**

This community is found on mesic (non-wetland) sites of either flat or rolling coastal plain sediments. These sites are neither excessively drained nor have a significant seasonal high water table. In the study area, Mesic Pine Flatwoods commonly occurred on the breaks of interstream divides. This community has a closed to open canopy of longleaf pine, sometimes mixed with loblolly pine.

The understory is sparse (in frequently burned sites) to dense (in unburned sites), and contains species such as southern red oak, water oak, post oak, blackjack oak, mockernut hickory, and sweet-gum. A low shrub layer of varying density is usually present. Common species include inkberry, large gallberry, fetterbush, sweet bay, red bay, giant cane, and creeping blueberry. The herb layer is generally dominated by wiregrass in frequently burned areas, with bracken fern dominant in patches. Other typical herb species included broomstraw and panic grass.

### **Wet Pine Flatwoods**

This community occurs on seasonally wet to usually wet sites, generally on flat or nearly flat coastal plain sediments. While seasonally saturated, this community may become quite dry for part of the year. Wet Pine Flatwoods are most commonly observed in broad areas of interstream divides. In the study area, this community has a canopy of longleaf, loblolly, or pond pine, or any combination of the three. The understory is sometimes absent but usually contains invading hardwoods. The shrub layer varies in density and contains species similar to those in the Mesic Pine Flatwoods community. The herb layer is generally dominated by wiregrass, with bracken fern dominating locally. Other typical herbs included broomstraw and panic grass.

### **Pond Pine Woodland**

This community occurs on poorly drained interstream flats that are temporarily flooded or saturated. The Pond Pine Woodland community has an open to nearly closed canopy of pond pine, sometimes codominant with loblolly bay, and commonly includes lesser amounts of sweet bay, red maple, loblolly pine, and swamp bay. The shrub layer is usually tall and very dense unless recently burned. Common shrubs are titi, fetterbush, inkberry, large gallberry, sweet pepperbush, and swamp bay. Giant cane is often present in the shrub layer and laurel greenbrier is also common. Herbs are nearly absent under the dense woody cover, although occasional Virginia chain-fern, netted chain-fern, and moss clumps were observed.

### **Pocosin**

This community occurs on central to intermediate parts of domed peatlands on poorly drained interstream flats, and peat-filled Carolina bays and swales. In the study area, Pocosins were commonly observed serving as headwater wetlands to small coastal plain streams. A dense shrub layer between four to eight feet tall is common, with little evidence of fire. Pocosins are dominated by fetterbush, titi, and inkberry, with abundant

laurel greenbrier. Scattered pond pine, swamp bay, loblolly bay, and sweet bay were also commonly observed. Herbs are usually nearly absent beneath the dense shrub layer.

### **Xeric Sandhill Scrub**

This community consists of coarse, deep sands of ridge and swale systems, Carolina bay rims, and sandy uplands. These areas are the driest in the coastal plain. In the study area, the Xeric Sandhill Scrub community most commonly occurs on the sand ridge rims of pocosin-like Carolina bays. This community has an open canopy of longleaf pine, with an open to dense understory of turkey oak. Occasional sassafras and persimmon were observed. A sparse low shrub layer consisting primarily of huckleberry and poison oak is sometimes present. A sparse to moderately dense herb layer consists of species such as wiregrass and spikemoss.

### **Coastal Plain Bottomland Hardwood Forest – Blackwater Subtype**

This community is seasonally to intermittently flooded, and is commonly observed on the floodplains of larger streams within the study area. Bottomland hardwoods are expected to form a stable climax forest, having an uneven-aged canopy with primarily gap phase regeneration. The canopy is dominated by various combinations of bottomland hardwoods and conifers. Species observed include laurel oak, water oak, red maple, loblolly pine, and sweet-gum. The understory includes red maple, swamp bay, American holly, and sweet bay. The shrub layer is often well developed and sometimes includes dense titi and giant cane. Vines are sometimes dense with common greenbrier, poison ivy, muscadine, and supplejack. The herb layer is poorly developed but includes occurrences of Christmas fern, Virginia chain-fern, netted chain-fern, and royal fern.

### **Nonriverine Wet Hardwood Forest**

This community occurs on poorly drained interstream flats not associated with rivers or estuaries. These sites are seasonally saturated or flooded by high water tables, poor drainage, and by sheet flow from adjacent pocosins. The community is dominated by various hardwood trees typical of bottomlands. Common species include swamp chestnut oak, laurel oak, yellow poplar, sweet-gum, red maple, and swamp blackgum. The understory includes species such as musclewood, red maple, and American holly. The shrub layer is generally sparse to moderately dense. Species include spicebush, swamp bay, coastal doghobble, sweet pepperbush, highbush blueberry, wax myrtle, giant cane, swamp palmetto, and beauty-berry. Vines such as crossvine, poison ivy, trumpet creeper, and grape vines are common. The herb layer includes sedges, lizard's tail, false nettle, Christmas fern, and netted chain-fern.

### **Pine Savanna**

This community occurs on wet, generally flat areas that are seasonally saturated by a high or perched water table. These communities naturally experience frequent, fairly low intensity surface fires. The Pine Savanna community has an open to sparse canopy of longleaf pine with pond pine sometimes codominating or dominating. Scattered inkberry, creeping blueberry, wax myrtle, and other shrubs are often present. The herb



layer is generally dense, unless recently burned, and is very diverse, with grasses, sedges, composites, orchids, and lilies particularly prominent. Insectivorous plants such as Venus flytrap, yellow pitcher plant, purple pitcher plant, and sundew are commonly observed.

### **Cutover**

This community consists of areas that have been logged within five years and are in early forest succession stages. Small loblolly and pond pines are common growing beneath larger shrub and herbaceous species that are first to establish dominance in these areas. Aside from the pines, the dominant species include sweet-gum, red maple, inkberry, wax myrtle, red chokeberry, fetterbush, greenbrier, blackberry, Japanese honeysuckle, broomsedge, and goldenrods.

### **Coastal Plain Small Stream Swamp – Blackwater Subtype**

This community is found on floodplains of small blackwater streams. Blackwater streams, in contrast to brownwater, tend to have highly variable flow regimes, with floods of short duration, and periods of very low flow resulting in the community being intermittently, temporarily, or seasonally flooded. The canopy is dominated by various combinations of bald cypress, swamp blackgum, and various other blackwater river floodplain species including sweet-gum, yellow poplar, red maple, laurel oak, swamp chestnut oak, river birch, loblolly pine, and pond pine. The understory is similarly variable. Species include musclewood, red maple, American holly, sweet bay, swamp bay, and titi. The shrub layer ranges from sparse to dense and almost pocosin-like. Dominant species include coastal doghobble and fetterbush. Vines, particularly poison ivy, greenbrier, laurel greenbrier, and supplejack, are common.

### **Cypress/Gum Swamp – Blackwater Subtype**

Cypress/Gum Swamp communities are common in the lower and middle parts of the coastal plain. This community is found in backswamps, sloughs, swales, and featureless floodplains of blackwater rivers, and is seasonally to semi-permanently flooded. In the study area, this community most commonly occurs as backswamp areas to larger perennial streams and open bodies of water. The canopy is dominated by swamp blackgum, bald cypress, or pond cypress. The understory and shrub layer are usually poorly developed or absent. Swamp blackgum and red maple are the most typical species, with swamp bay, sweet bay, and buttonbush occurring in places. Observed shrub species include titi and fetterbush. The herb layer ranges from nearly absent to moderate cover. Species include lizard's tail, sedge, and netted chain-fern.

### **Nonriverine Swamp Forest**

This community is observed on wet, very poorly drained upland flats that are saturated at least seasonally, or are shallowly flooded by the high water table. The canopy contains varying mixtures of pond cypress, bald cypress, swamp tupelo, loblolly pine, pond pine, yellow poplar, and red maple. Understory species that were observed include sweet bay,

swamp bay, titi, fetterbush, sweet pepperbush, blueberry, and laurel greenbrier. Typical herbs include Virginia chain-fern, netted chain-fern, sedges, and sphagnum moss.

### **Small Depression Pocosin**

This community occurs in the form of small Carolina bays and other small depressions in upland, usually sandy areas. These areas are seasonally flooded or intermittently exposed and may receive drainage from surrounding sandy areas. In the study area, this community commonly occurs in areas mapped with Autryville and Baymeade soil types. A dense to fairly dense shrub layer was observed, with species including fetterbush, titi, inkberry, sweet pepperbush, dangleberry, blueberry, and lamb-kill. The canopy is usually dominated by pond pine, red maple, or swamp bay, with associated sweet bay, swamp blackgum, pond cypress, loblolly pine, and loblolly bay. Laurel greenbrier is common. Herbs are generally sparse, but cinnamon fern, Virginia chain-fern, netted chain-fern, and sedges were observed.

### **Small Depression Pond**

This community occurs in the form of sinkholes, Carolina bays, and other upland depressions that are permanently flooded in the center and grade outward to the prevailing hydrology of the surrounding area. This community is also generally associated with upland soils such as Autryville and Baymeade, but sometimes occurs within larger wetland complexes. These ponds are surrounded by a pocosin-like density of shrubs and include species such as titi, fetterbush, and inkberry, along with distinctive pond-shore species such as buttonbush. Scattered pond cypress and swamp blackgum were observed. Shallow water and exposed edges may contained a variety of emergent and wetland plants, including panic grass, spike-rush and other rush species, a number of sedge species, sundew, and often Virginia chain-fern.

## **3.5.2.1.2 INVASIVE EXOTIC PLANT SPECIES**

Fifteen species from NCDOT's Invasive Exotic Plant List for North Carolina were found to occur within the study area. The species identified were tree of heaven (Threat level 1), Chinese privet (Threat level 1), multiflora rose (Threat level 1), Japanese grass (Threat level 1), kudzu (Threat level 1), hydrilla (Threat level 1), mimosa (Threat level 2), autumn olive (Threat level 2), shrub lespedeza (Threat level 2), bamboo (Threat level 2), Johnson grass (Threat level 2), English ivy (Threat level 2), Japanese honeysuckle (Threat level 2), Chinese wisteria (Threat level 2), and Bradford pear (Threat level 3).

## **3.5.2.1.3 TERRESTRIAL WILDLIFE**

Terrestrial communities within the study area are comprised of both natural and disturbed habitats that may support a diversity of wildlife species. Species observed during field investigations are discussed below. Species for which there was evidence in the form of scat or tracks are also included in the discussion.

Mammal species that were observed utilizing forested habitats and stream corridors within the study area include beaver, black bear, coyote, bobcat, Eastern cottontail, gray

squirrel, muskrat, cotton mouse, raccoon, gray fox, Virginia opossum, wild pig, white-tailed deer, and woodchuck. Birds that were observed using forest and forest edge habitats include American bittern, crow, woodcock, Carolina chickadee, bobwhite quail, cardinal, Carolina wren, common flicker, downy woodpecker, red-bellied woodpecker, Eastern bluebird, mockingbird, mourning dove, myrtle warbler, pine warbler, prairie warbler, tufted titmouse, prothonotary warbler, wild turkey, wood thrush, and yellow-rumped warbler. Birds observed using the open habitat or water bodies within the study area include bald eagle, belted kingfisher, Canada goose, Cooper's hawk, field sparrow, gray catbird, great blue heron, laughing gull, ring-billed seagull, mallard, osprey, red-tailed hawk, turkey vulture, and red-winged blackbird. Reptile and amphibian species observed using terrestrial communities within the study area include black racer, eastern box turtle, eastern fence lizard, eastern king snake, five-lined skink, eastern garter snake, green anole, rat snake, six-lined racerunner, rough green snake, copperhead, canebrake rattlesnake, spring peeper, and southern toad.

### **3.5.2.2 AQUATIC COMMUNITIES AND WILDLIFE**

Aquatic communities within the study area consist of perennial and intermittent coastal plain streams, swamps, small depression ponds, and maintained farm ponds. These communities can support various fish, reptile, and amphibian species, as well as mollusks and crustaceans. Species observed in or along perennial streams within the study area include brown water snake, snapping turtle, bluegill, Eastern crayfish, green treefrog, barking treefrog, and water moccasin. Intermittent streams within the study area are relatively small in size but were observed supporting crayfish, yellowbelly slider, bullfrogs, and various benthic macroinvertebrates. Pond and swamp habitats support bluegill, largemouth bass, snapping turtle, crayfish, bullfrogs, American alligator, spotted turtle, green treefrog, brown water snake, and water moccasin.

### **3.5.3 WATER RESOURCES**

Descriptions of water resources identified within the study area during field investigations include physical and water quality characteristics, best usage classifications, and relationships to major regional drainage systems. Water resources within the study area are part of the Cape Fear and Onslow Bay River Basins (US Geological Survey [USGS] Hydrologic Units 03030007 and 03020302).

#### **3.5.3.1 GROUNDWATER**

Groundwater data indicate the groundwater surface is typically one to four feet below the natural ground surface. Lateral ditches along existing roads appear to be functioning adequately. Portions of five different aquifers are located within the study area. Descriptions of the aquifers are provided below.

##### **Castle Hayne Aquifer**

The Castle Hayne aquifer is located in both the New Hanover and Pender County portions of the study area. In addition to supplying some industrial and agricultural

usages, a number of municipal well fields are supplied by the aquifer. These municipal areas include the City of Wilmington, New Hanover beach towns, the New Hanover County water system, Topsail Island, and Surf City. According to the North Carolina Division of Water Resources, the Castle Hayne aquifer is the state's most productive aquifer. Wells associated with this aquifer yield 200-500 gallons per minute (gpm) on average, although the yield can reach more than 2,000 gpm.

### **Peedee Aquifer**

The Peedee aquifer is present in the New Hanover County portion of the study area. The Peedee aquifer supplies well fields used by New Hanover County. On average, wells associated with this aquifer yield up to 200 gpm.

### **Black Creek, Upper Cape Fear, and Lower Cape Fear Aquifers**

Black Creek, Upper Cape Fear, and Lower Cape Fear aquifers are present within the study area. However, New Hanover and Pender Counties depend little, if any, on these aquifers for water supply, due to their increased salinity.

#### **3.5.3.1.1 WELLS**

North Carolina Department of Environment and Natural Resources, Division of Environmental Health data indicate there are numerous public water supply wells within the study area. State regulations for public water supply wells stipulate that the area within 100 feet of a well be owned or controlled by the person supplying the water (15A NCAC 18C.0203).

The Cape Fear Public Utilities Authority (CFPUA) has numerous existing and proposed well sites within the project area associated with their groundwater nanofiltration water treatment plant (WTP). The WTP is located adjacent to proposed Military Cutoff Road Extension Alternatives M1 and M2 where they share an alignment just north of Torchwood Boulevard. The existing CFPUA wells in the vicinity of Military Cutoff Road Extension Alternatives M1 and M2 are shown on Figure 10C and Figure 16B. A summary of these wells is provided in Table 4-13 in Section 4.5.3.1.1.

The CFPUA developed a Wellhead Protection Plan (WHPP) in coordination with the North Carolina Department of Environment and Natural Resources' (NCDENR's) Public Water Supply (PWS) Section. The CFPUA's WHPP is non-regulatory and identifies strategies to manage the wellhead protection area for their northern water system. Existing state rules and regulations are relied on to manage risks associated with transportation infrastructure located within wellhead protection areas managed through the non-regulatory approach.

### **3.5.3.2 STREAMS, WETLANDS AND OTHER SURFACE WATERS**

#### **3.5.3.2.1 STREAMS**

A total of 136 streams were identified within the study area (Table 3-8). The number of streams identified within the study area increased by two since the DEIS as a result of the extended study areas discussed in Section 3.5. Streams within the study corridors for the DEIS detailed study alternatives and NCDOT's preferred alternative are shown on Figures 10A through 10K and Figures 16A through 16G. Five streams within one mile downstream of the study area have been designated High Quality Water (HQW), and one stream within one mile downstream of the study area has been designated Outstanding Resource Water (ORW) by the North Carolina Division of Water Resources (NCDWR). Futch Creek, Old Topsail Creek, Pages Creek, Nixons Creek, and an unnamed tributary to the Atlantic Intracoastal Waterway (AIWW) receive water from streams within the study area and are designated HQW from their source to their confluence with the AIWW. Howe Creek receives water from streams within the study area and has been designated ORW from its source to its confluence with the AIWW. HQW/ORW watershed areas also are shown on Figures 10A through 10K and Figures 16A through 16G. All tributaries within the study area of the downstream streams designated HQW are classified as SA; HQW due to the classification of their receiving waters. However, most of the streams within the study area have a best usage classification of C; Sw. There are no water supply watersheds (WS-I or WS-II) or North Carolina 2012 Final 303(d) listed (due to sedimentation or turbidity) streams within one mile downstream of the study area. Additionally, there are no benthic and/or fish monitoring sites within one mile downstream of the study area. No shellfish growing areas or primary nursery areas are present within the study area.

Table 3-8. Physical Characteristics of Streams within the Study Area

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
ASA	UT to Spring Branch	6 - 7	10 - 12	4 - 6	Sand	Slow	Clear	977	Perennial
BSA	UT to Smith Creek	6 - 7	8 - 10	6 - 10	Sand	Slow	Slightly Turbid	799.63	Perennial
BSJ	UT to Smith Creek	5 - 6	8 - 10	2 - 4	Sand	Slow	Slightly Turbid	2,466.12	Perennial
BSK	UT to Smith Creek	5 - 6	8 - 10	4 - 6	Sand	Slow	Slightly Turbid	3,012.17	Perennial
BSL	UT to Smith Creek	5 - 6	8 - 10	4 - 8	Sand	Slow	Slightly Turbid	318.06	Perennial
BSM	UT to Smith Creek	6 - 7	15 - 20	4 - 6	Sand	Slow	Slightly Turbid	1,065.21	Perennial
BSN	UT to Smith Creek	6 - 7	15 - 20	4 - 6	Sand	Slow	Slightly Turbid	970.2	Perennial
BSO	UT to Smith Creek	6 - 7	15 - 20	12 - 18	Sand	Slow	Turbid	2,401.7	Perennial
BSP	UT to Smith Creek	5 - 6	15 - 18	8 - 16	Sand/Gravel	Moderate	Slightly Turbid	1,342.78	Perennial
BSQ	UT to Smith Creek	5 - 6	15 - 18	8 - 16	Sand/Gravel	Moderate	Slightly Turbid	450.13	Perennial
BDITCH1	UT to Howe Creek	3	7	4 - 12	Sand	Slow	Turbid	254.09	OHWM <sup>1</sup>
								513.01	
CSA	UT to Island Creek	6 - 7	10 - 12	12 - 16	Sand	Slow	Turbid	3,021.28	Perennial
CSAX <sup>2</sup>	UT to Island Creek	6 - 7	10 - 12	12 - 16	Sand	Slow	Slightly Turbid	1,763.90	Perennial
CSB	UT to Island Creek	6 - 8	12 - 15	12 - 16	Sand	Slow	Turbid	2,175.34	Perennial
CSC	UT to Smith Creek	4 - 5	8 - 10	4 - 8	Sand	Stagnant	Slightly Turbid	944.11	OHWM <sup>1</sup>
CSD	UT to Smith Creek	4 - 5	8 - 10	4 - 8	Sand	Stagnant	Slightly Turbid	2,470.29	Intermittent
								1,087.24	Perennial
CSE	UT to Smith Creek	3 - 4	6 - 8	2 - 4	Sand	Stagnant	Slightly Turbid	629.51	OHWM <sup>1</sup>
CSF	UT to Smith Creek	2	3 - 4	2	Sand	Stagnant	Slightly Turbid	161.59	OHWM <sup>1</sup>
CSG	UT to Smith Creek	6 - 7	12 - 15	4 - 8	Sand	Stagnant	Slightly Turbid	499.56	Intermittent
CSH	UT to Smith Creek	6 - 7	12 - 15	6 - 10	Sand	Slow	Slightly Turbid	832.96	Intermittent
CSI	UT to Smith Creek	6 - 7	12 - 15	6 - 10	Sand	Stagnant	Slightly Turbid	1,070.75	Perennial
CSJ	UT to Island Creek	6 - 7	12 - 15	4 - 6	Sand	Stagnant	Slightly Turbid	1,503.26	Perennial
CSJX <sup>2</sup>	UT to Island Creek	3 - 4	5 - 6	6 - 10	Sand	Slow	Clear/Tannic	323.60	Perennial
CSK	UT to Island Creek	5 - 6	10 - 14	4 - 8	Sand/Gravel	Slow	Clear	399.56	Perennial

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
DSA	UT to Island Creek	6 - 8	12 - 15	12 - 16	Sand	Slow	Turbid	3,486.92	Perennial
ESA	UT to Mill Creek	2	6	4 - 24	Sand	Slow	Slightly Turbid	1,431.43	Perennial
ESB	UT to Mill Creek	2	3	3 - 8	Sand	Slow	Slightly Turbid	245.43	Perennial
FSA	UT to Island Creek	3 - 6	12	0.5 - 36	Sand	Moderate	Clear/Tannic	4,475.76	Perennial
FSB	UT to Island Creek	4 - 5	12	12 - 24	Sand	Moderate	Clear/Tannic	1,085.48	Intermittent
FSC	UT to Island Creek	2 - 4	8	6 - 12	Sand	Slow	Clear	538.43	Intermittent
FSD	UT to Island Creek	4 - 5	2	2	Sand	Slow	Clear	120.33	Intermittent
FSE	UT to Island Creek	1 - 2	2 - 3	6 - 12	Sand/Clay	Slow	Clear/Tannic	1,609.51	Perennial
FSH	UT to Island Creek	4 - 6	8 - 10	12 - 24	Sand	Moderate	Clear/Tannic	526.05	OHWM <sup>1</sup>
								916.85	
								100.63	OHWM <sup>1</sup>
								269.69	
FSI	UT to Island Creek	2 - 4	6 - 8	6 - 24	Sand	Moderate	Clear/Tannic	713.05	Intermittent
								1,163.97	Perennial
FSJ	UT to Island Creek	3 - 6	3 - 6	0.5 - 36	Sand	Moderate	Clear/Tannic	568.64	Perennial
FSK	UT to Island Creek	1 - 2	2 - 4	3 - 12	Sand	Slow	Tannic	858.61	Intermittent
GFSE	UT to Island Creek	4	8	6 - 36	Sand	Fast	Clear/Tannic	1295.5	Intermittent
GSA	UT to Island Creek	0.5 - 2	4	6 - 12	Sand	Moderate	Clear/Tannic	1176.4	Perennial
GSB	UT to Island Creek	3 - 6	8 - 12	24 - 48	Sand	Stagnant	Clear/Tannic	417.82	Perennial
GSG	UT to Island Creek	6 - 8	8	12 - 48	Sand	Stagnant	Clear/Tannic	259.38	Intermittent
GSX	UT to Island Creek	1	5	6 - 10	Sand	Moderate	Clear/Tannic	913.05	Intermittent
HBSA	UT to Island Creek	2 - 3	2 - 3	6 - 18	Sand	Slow	Clear	392.87	Perennial
HBSAA	UT to Island Creek	2 - 5	5	3 - 6	Sand	Slow	Clear	1,892.57	Perennial
								349.96	Intermittent
HBSB	UT to Island Creek	2 - 3	2.5 - 3	3 - 6	Sand	Slow	Clear	1,564.99	Perennial
HBSC	UT to Island Creek	1 - 3	2.5 - 3	6 - 12	Sand	Slow	Clear	535.6	Intermittent
								420.97	Intermittent
								1,343.94	Perennial

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
HBSD(1)	UT to Island Creek	1 - 3	2.5 - 3	6 - 10	Sand	Slow	Clear	628.05	Intermittent
								544.09	Perennial
HBSD(2)	UT to Island Creek	2 - 4	12 - 15	6 - 24	Sand	Slow	Clear/Tannic	7,326.24	Perennial
HBSE	UT to Island Creek	2 - 3	1 - 2	6 - 12	Sand	Stagnant	Clear/Tannic	406.4	Perennial
HBSF	Island Creek	2 - 4	8 - 12	3 - 36	Sand	Slow	Clear/Tannic	5,430.04	Perennial
HBSG	UT to Island Creek	2 - 4	12 - 12	6 - 24	Sand	Slow	Clear	2,552.85	Perennial
HBSH	UT to Island Creek	2 - 3	2	1 - 4	Sand	Slow	Clear	391.78	Intermittent
HSA	UT to Harrisons Creek	3	5	1 - 6	Sand	Stagnant	Clear	103.82	Intermittent
HSB	UT to Harrisons Creek	1	5	1 - 6	Sand	Stagnant	Clear	789.7	Intermittent
HSC	UT to Harrisons Creek	2 - 3	5	1 - 6	Sand	Stagnant	Clear	3,382.55	Perennial
HSCA	UT to Harrisons Creek	1 - 2	2 - 3	1 - 6	Sand	Slow	Clear	228.37	Intermittent
HSD	UT to Harrisons Creek	2	2 - 4	2 - 10	Sand	Slow	Clear	176.33	Intermittent
HSE	UT to Island Creek	0.5 - 1	2	1 - 6	Sand	Moderate	Clear	66.9	Intermittent
HSX	UT to Harrisons Creek	0.5 - 2	6 - 8	6 - 24	Sand	Moderate	Clear/Tannic	1,241.32	Perennial
HSZ	UT to Harrisons Creek	2 - 3	2 - 4	6 - 18	Sand	Moderate	Slightly Turbid	176.39	Perennial
HDITCH1	UT to Harrisons Creek	6 - 8	8	12 - 24	Sand	Slow	Clear/Tannic	2,041.86	OHWM <sup>1</sup>
HDITCH2	UT to Harrisons Creek	6 - 8	8	12 - 24	Sand	Slow	Clear/Tannic	1691.7	OHWM <sup>1</sup>
ISA	UT to Island Creek	0.5 - 1	5 - 10	3 - 6	Sand	Moderate	Clear	392.6	Intermittent
								797.73	Perennial
ISB	UT to Island Creek	0 - 1	5 - 15	3 - 9	Sand	Moderate	Clear	1,873.06	Perennial



Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
ISC	UT to Harrisons Creek	0.5 - 1	5	6 - 12	Sand	Moderate	Clear	616.06	Intermittent
								615.71	Perennial
ISD	UT to Harrisons Creek	0.5 - 2	6 - 8	6 - 24	Sand	Moderate	Clear/Tannic	1,350.07	Perennial
IDITCH1	UT to Harrisons Creek	6 - 8	5	6 - 12	Sand	Fast	Clear/Tannic	1,775.16	OHWM <sup>1</sup>
JSA	UT to Old Topsail Creek	3	3	2 - 6	Sand	Slow	Slightly Turbid	109.51	OHWM <sup>1</sup>
								671.96	
								1,168.01	Intermittent
JSB	UT to Old Topsail Creek	2	3	2 - 6	Sand	Slow	Slightly Turbid	523.77	Intermittent
JSC	UT to Old Topsail Creek	3	3	2 - 6	Sand	Slow	Clear	729.48	Intermittent
JSD	UT to Old Topsail Creek	2	3	3 - 12	Sand	Slow	Clear	1,049.63	Intermittent
								1,314.95	Perennial
LSA	UT to Harrisons Creek	0 - 6	20	48 - 60	Sand	Slow	Clear/Tannic	709.28	Perennial
KDITCH	UT to Godfrey Creek	2 - 3	4 - 5	10 - 14	Sand	Stagnant	Clear/Tannic	156.20	OHWM <sup>1</sup>
LSAA	UT to Harrisons Creek	0.5 - 1	3-5	6 - 12	Sand	Slow	Clear/Tannic	330.44	Perennial
LSAB	UT to Harrisons Creek	0.5 - 1	3-5	2 - 6	Sand	Slow	Clear/Tannic	216.05	OHWM <sup>1</sup>
LSB	UT to Harrisons Creek	0.5 - 1	3 - 8	3 - 6	Silt/Sand	Moderate	Clear	2,341.71	Perennial
LSC	Harrisons Creek	1 - 3	10 - 15	3 - 9	Sand	Moderate	Clear	2,897.09	Perennial
LSCA	UT to Harrisons Creek	0.5 - 1	4	2 - 6	Silt/Sand	Moderate	Clear	353.54	Intermittent
								503.33	Perennial
LSCAA	UT to Harrisons Creek	1	3	2 - 6	Silt/Sand	Moderate	Clear	530.3	Perennial

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
LSCB	UT to Harrisons Creek	0 - 0.5	6	2 - 6	Silt/Sand	Moderate	Clear	877.37	Perennial
LSCBA	UT to Harrisons Creek	0 - 0.5	3	1 - 3	Silt/Sand	Slow	Clear	65.75	OHWM <sup>1</sup>
LSCC	UT to Harrisons Creek	3 - 4	4	2 - 6	Silt/Sand	Slow	Turbid	456.63	Perennial
LSCD	UT to Harrisons Creek	1 - 2	2	1 - 3	Silt/Sand	Moderate	Clear	203.29	Intermittent
LSCE	UT to Harrisons Creek	3 - 4	4	1 - 3	Silt/Sand	Slow	Turbid	210.14	Intermittent
LSCF	UT to Harrisons Creek	3 - 4	3	1 - 3	Silt/Gravel	Moderate	Clear	167.22	Intermittent
LSD	Godfrey Creek	1 - 2	10	2 - 6	Sand	Slow	Clear	2,870.01	Perennial
LSDA	UT to Godfrey Creek	3	2	2 - 6	Silt/Sand	Slow	Turbid	1012.8	Intermittent
LSE	UT to Godfrey Creek	2 - 3	5 - 10	2 - 6	Sand	Moderate	Clear	1,484.12	Perennial
LTRIB1	UT to Godfrey Creek	2 - 3	5 - 10	2 - 6	Silt/Sand	Slow	Turbid	703.55	OHWM <sup>1</sup>
MSA	UT to Trumpeters Swamp	3	4	1 - 3	Sand	Slow	Clear	128.1	Intermittent
MSAA	UT to Trumpeters Swamp	3	4	1 - 3	Sand	Moderate	Clear	226.14	OHWM <sup>1</sup>
MSB	UT to Trumpeters Swamp	2	6	2 - 10	Silt/Sand	Slow	Clear	1002.8	Perennial
MSC	UT to Godfrey Creek	10	3	2 - 12	Sand	Moderate	Clear/Tannic	1,388.7	Perennial
MSCA	UT to Godfrey Creek	5	7	6 - 18	Sand	Fast	Clear/Tannic	445.65	Perennial
MSD	Godfrey Creek	0.5 - 1	7	2 - 24	Sand	Moderate	Clear/Tannic	1,193.96	Perennial
MSDA	UT to Godfrey Creek	3 - 4	2	2 - 6	Sand	Moderate	Clear	689.23	OHWM <sup>1</sup>
								186.09	Intermittent
								152.75	Perennial

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
MSE	UT to Harrisons Creek	0.5	3	2 - 10	Sand	Slow	Clear/Tannic	236.97	Perennial
MSF	Harrisons Creek	0.5	8 - 10	12 - 36	Sand	Slow	Clear/Tannic	1,255.75	Perennial
MSFA	UT to Harrisons Creek	0.5 - 1	2	2 - 8	Sand	Moderate	Clear	448.66	Perennial
MSFB	UT to Harrisons Creek	0.5 - 1	2	1 - 4	Sand	Slow	Clear	133.24	Intermittent
MSI	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Fast	Clear	274.01	OHW <sup>1</sup>
								744.77	Intermittent
MDITCH1	UT to Godfrey Creek	5	7	6 - 18	Sand	Stagnant	Clear/Tannic	1,025.42	OHW <sup>1</sup>
MDITCH2	UT to Godfrey Creek	5	7	6 - 18	Sand	Stagnant	Clear/Tannic	1,011.27	OHW <sup>1</sup>
MDITCH3	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	395.49	OHW <sup>1</sup>
MDITCH4	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	622.23	OHW <sup>1</sup>
MDITCH5	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	466.64	OHW <sup>1</sup>
MDITCH6	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	518.44	OHW <sup>1</sup>
MDITCH7	UT to Godfrey Creek	5	7	6 - 18	Sand	Stagnant	Clear/Tannic	1,260.69	OHW <sup>1</sup>
MDITCH8	UT to Godfrey Creek	5	7	6 - 18	Sand	Stagnant	Clear/Tannic	2,028.45	OHW <sup>1</sup>
MDITCH9	UT to Godfrey Creek	5	7	6 - 18	Sand	Slow	Clear/Tannic	2,032.12	OHW <sup>1</sup>
MDITCH10	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	528.69	OHW <sup>1</sup>
MDITCH11	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	583.05	OHW <sup>1</sup>
MDITCH12	UT to Godfrey Creek	3	2 - 3	3 - 6	Sand	Slow	Clear/Tannic	1,028.25	OHW <sup>1</sup>
NSA	UT to Nixons Creek	2 - 3	3 - 4	4 - 8	Sand	Slow	Clear	346.17	Intermittent
								129.12	Perennial
NSAX <sup>2</sup>	UT to Nixons Creek	2 - 3	3 - 4	4 - 8	Sand	Slow	Clear	55.00	Perennial
NSB	UT to AIWW <sup>3</sup>	6	4 - 5	4 - 8	Sand	Slow	Clear	82.65	OHW <sup>1</sup>
NSE	UT to AIWW <sup>3</sup>	4 - 5	2 - 8	4 - 8	Sand	Slow	Clear	60.82	OHW <sup>1</sup>
								62.11	

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
NSF	UT to AIWW <sup>3</sup>	4 - 5	4 - 6	4 - 8	Sand	Slow	Slightly Turbid	483.38	Intermittent
								1,445.17	Perennial
NDITCH1	UT to AIWW <sup>3</sup>	2 - 3	5 - 7	2 - 8	Sand	Slow	Clear	259.68	OHWM <sup>1</sup>
ZSA	UT to Pages Creek	3	3 - 4	2 - 6	Sand	Slow	Clear	79.14	Intermittent
ZSB	UT to Futch Creek	1 - 3	4 - 6	6 - 24	Sand	Fast	Tannic	452.6	Perennial
ZSC	UT to Mill Creek	3	4 - 5	6	Sand	Moderate	Clear	303.29	OHWM <sup>1</sup>
								267.96	Intermittent
ZSD	UT to Old Topsail Creek	2	2 - 3	6 - 12	Sand	Slow	Tannic	340.76	Perennial
ZSE	UT to Harrisons Creek	1	2	6 - 12	Sand	Stagnant	Clear	90.29	OHWM <sup>1</sup>
								16.7	
								103.73	Intermittent
ZSF	UT to Pages Creek	1	2 - 3	6 - 12	Sand	Fast	Clear	90.78	Intermittent
ZSG	UT to Pages Creek	0.5 - 3	4 - 5	4 - 8	Sand	Slow	Tannic	151.4	Perennial
ZSH	Spring Branch	2 - 3	4 - 5	4 - 8	Sand	Fast	Clear	952.87	Perennial
ZSJ	UT to Old Topsail Creek	2	5 - 6	6 - 8	Sand	Fast	Clear/Tannic	195.56	Intermittent
ZSK	UT to Prince George Creek	1 - 3	3 - 4	6 - 18	Sand	Fast	Tannic	3,216.93	Perennial
ZSL	UT to Prince George Creek	1 - 3	3 - 4	6 - 18	Sand	Fast	Tannic	322.7	Perennial
ZSM	UT to Old Topsail Creek	<1	2 - 3	4 - 10	Sand	Slow	Clear	807.98	Intermittent
ZDITCH1	UT to Mill Creek	4	3	0 - 2	Sand	Slow	Clear	187.33	OHWM <sup>1</sup>
ZDITCH2	UT to Mill Creek	4	3	0 - 2	Sand	Slow	Clear	213.42	OHWM <sup>1</sup>
ZDITCH3	UT to Mill Creek	4	3	0 - 2	Sand	Slow	Clear	385.88	OHWM <sup>1</sup>
ZDITCH4	UT to Mill Creek	4	3	0 - 2	Sand	Slow	Clear	169.28	OHWM <sup>1</sup>
ZDITCH5	UT to Mill Creek	4	3	0 - 2	Sand	Slow	Clear	147.04	OHWM <sup>1</sup>

Table 3-8. Physical Characteristics of Streams within the Study Area *continued*

Stream ID	Stream Name	Bank Height (feet)	Bankfull Width (feet)	Water Depth (inches)	Channel Substrate	Velocity	Clarity	Length in Study Area (feet)	Stream Determination
ZTRIB1	UT to Old Topsail Creek	4	4	6 - 12	Sand	Slow	Clear	206.59	OHWM <sup>1</sup>
ZTRIB2	UT to Harrisons Creek	5	10	12 - 24	Sand	Stagnant	Slightly Turbid	430.27	OHWM <sup>1</sup>
12SA	UT to Old Topsail Creek	3 - 6	2 - 3	2 - 12	Sand	Moderate	Clear	94.00	OHWM <sup>1</sup> Intermittent
								482.00	

<sup>1</sup>Resource determined by USACE to be a jurisdictional tributary based on the presence of an ordinary high water mark (OHWM) during field verification.

<sup>2</sup>Streams with an "X" at the end of the Stream ID are streams identified in the extended study areas that are extensions of streams previously identified in the DEIS.

<sup>3</sup>Atlantic Intracoastal Waterway

### 3.5.3.2.2 OTHER SURFACE WATERS

Eighty-seven ponds are located within the study area. The number of ponds identified within the study area increased since the DEIS as a result of two ponds identified within the extended study area for the Lendire Road improvements. Ponds within the study corridors for the DEIS detailed study alternatives and NCDOT's preferred alternative are shown on Figures 10A through 10K and Figures 16A through 16G. Table 3-9 describes the appearance of each pond including its approximate size in acres. If the pond is directly connected to a jurisdictional stream or wetland, the name of that feature is also indicated in the table.

Table 3-9. Physical Characteristics of Other Surface Waters within the Study Area

Pond ID	Appearance	Connected Feature Map ID	Pond Area in Study Area (acres)
BPA	Stormwater Pond	No Connection	0.15
BPB	Stormwater Pond	No Connection	0.14
BPC	Residential Small Lake	No Connection	1.66
BPD	Manmade/Maintained	BWE	0.41
BPE	Stormwater Pond	BSL	4.08
BPF	Stormwater Pond	BSO	2.28
BPG	Stormwater Pond	BSO	0.60
BPH	Stormwater Pond	No Connection	0.46
BPI	Stormwater Pond	BSA	0.30
BPJ	Stormwater Pond	No Connection	0.12
BPK	Stormwater Pond	No Connection	0.07
CPA	Small Borrow Pit	CWF	0.05
EPA	Stormwater Pond	No Connection	0.03
GPA	Stormwater Pond	GWA	0.12
GPB	Stormwater Pond	GWA	0.07
GPC	Stormwater Pond	GWA	0.12
GPD	Stormwater Pond	No Connection	0.11
IPA	Maintained Farm Pond	IWA	0.11
IPA2	Stormwater Pond	IWT	0.57
IPB	Maintained Farm Pond	IWA	0.04
IPB2	Small Depression Pond	IWA	0.06
IPC	Small Depression Pond	IWT	0.08

Table 3-9. Physical Characteristics of Other Surface Waters within the Study Area  
*continued*

Pond ID	Appearance	Connected Feature Map ID	Pond Area in Study Area (acres)
IPD	Maintained Farm Pond	HWA	0.15
IPE	Stormwater Pond	No Connection	0.27
IPF	Manmade/Maintained	IWB	0.54
IPG	Maintained Farm Pond	No Connection	0.07
IPH	Stormwater Pond	IWT	0.11
JPA	Stormwater Pond	JWD	0.11
JPB	Stormwater Pond	No Connection	0.09
JPC	Small Depression Pond	JWJ	0.37
JPD	Cypress/Gum Depression	KWG	2.44
JPE	Stormwater Pond	No Connection	0.10
JPF	Stormwater Pond	No Connection	0.10
JPG	Stormwater Pond	JWQ	0.07
JPH	Small Depression Pond	No Connection	0.32
KPA	Manmade/Maintained	No Connection	0.37
KPB	Cypress/Gum Depression	KWA/KWG	0.54
KPC	Manmade/Maintained	KWF	0.57
KPD	Manmade/Maintained	KWD	0.15
KPE	Stormwater Pond	KWD	0.02
KPF	Stormwater Pond	KWD	0.09
KPG	Stormwater Pond	KWE	0.26
KPH	Cypress/Gum Depression	KWA/KWG	0.09
LPA	Manmade/Maintained	LSC	0.15
LPB	Manmade/Maintained	LWF	0.50
LPC	Manmade/Maintained	LWK	0.07
LPD	Manmade/Maintained	LWA	0.33
LPE	Manmade/Maintained	No Connection	0.38
MPA	Stormwater Pond	MWJ	0.05
MPB	Stormwater Pond	MWJ	0.11
MPC	Wastewater Retention	No Connection	1.14
MPD	In-line Pond	MSDA	0.10
MPE	Small Borrow Pond	MWL	0.08

Table 3-9. Physical Characteristics of Other Surface Waters within the Study Area  
continued

Pond ID	Appearance	Connected Feature Map ID	Pond Area in Study Area (acres)
MPF	Manmade/Maintained	MWH	0.13
MPG	Manmade/Maintained	MWH	0.40
MPH	Manmade/Maintained	No Connection	0.11
MPI	Small Farm Pond	No Connection	0.08
NPA	Small Borrow Pond	No Connection	0.37
NPB	In-line Pond	NSF	0.41
NPC	Stormwater Pond	No Connection	0.06
NPD	Stormwater Pond	No Connection	0.26
NPE	Water Treatment Pond	No Connection	0.70
XPA	Stormwater Pond	No Connection	0.26
XPB	Stormwater Pond	No Connection	0.10
ZNPA	Manmade/Borrow Pond	NWP	1.24
ZNPB	Manmade/Borrow Pond	No Connection	0.74
ZPA	Manmade/Borrow Pond	GWB	0.02
ZPB	Manmade/Borrow Pond	GWB	1.96
ZPC	Manmade/Maintained	No Connection	0.60
ZPD	Stormwater Pond	No Connection	0.50
ZPE	Stormwater Pond	No Connection	0.44
ZPF	Stormwater Pond	No Connection	0.49
ZPG	Stormwater Pond	ZWBB	0.15
ZPH	Manmade/Excavated	No Connection	0.13
ZPI	Stormwater Pond	ZWAA	0.10
ZPJ	Stormwater Pond	ZWAA	0.54
ZPK	Stormwater Pond	ZWAA	0.07
ZPL	Stormwater Pond	No Connection	0.65
ZPM	Stormwater Pond	ZWBB	0.08
ZPN	Stormwater Pond	No Connection	0.08
ZPO	Stormwater Pond	No Connection	0.08
ZPP	Stormwater Pond	ZWG	0.21
ZPQ	Stormwater Pond	No Connection	0.16
ZPR	Manmade/Maintained	No Connection	0.11
ZPS	Stormwater Pond	No Connection	0.72



Table 3-9. Physical Characteristics of Other Surface Waters within the Study Area  
*continued*

Pond ID	Appearance	Connected Feature Map ID	Pond Area in Study Area (acres)
ZPT	Manmade/Maintained	No Connection	0.03
ZPU	Small Depression Pond	No Connection	0.05

### 3.5.3.2.3 WETLANDS

A total of 287 jurisdictional wetlands were identified within the study area. The number of jurisdictional wetlands identified within the study area increased by one since the DEIS as a result of the extended study areas discussed in Section 3.5. Wetlands within the study corridors for the DEIS detailed study alternatives and NCDOT's preferred alternative are shown on Figures 10A through 10K and Figures 16A through 16G. Wetland classification and quality rating data are presented in Table 3-10. All wetlands within the study area are within the Cape Fear and Onslow Bay river basins (USGS Hydrologic Units 03030007 and 03020302).

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
BWB	PFO4B	Non-riparian	27	0.31
BWC	PFO	Non-riparian	25	0.35
BWD	PFO	Non-riparian	34	5.02
BWI	PFO1/3/4B	Non-riparian	34	11.09
CWA	PFO3/4A	Non-riparian	34	28.42
CWB	PSS3/4B	Non-riparian	36	66.17
CWC	PSS3/4Bd	Non-riparian	36	15.02
CWCX <sup>2</sup>	Pine Flat <sup>3</sup>	Non-riparian	36	0.05
CWD	PSS3/4Bd	Non-riparian	36	26.50
CWDX <sup>2</sup>	Pocosin <sup>3</sup>	Non-riparian	36	0.60
CWE	PFO3/4Bg	Non-riparian	36	65.50
		Riparian		3.51
CWEX <sup>2</sup>	Hardwood Flat <sup>3</sup>	Riparian	36	0.10
CWF	PFO3/4B	Non-riparian	36	61.44
DWC	PSS3/4B	Non-riparian	36	286.63
EWA	No ID	Non-riparian	15	0.35

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
EWB	No ID	Non-riparian	13	0.22
EW C	No ID	Riparian	16	2.81
EWD	No ID	Non-riparian	19	1.39
EW F	PFO	Riparian	14	0.46
EW H	PFO	Non-riparian	20	1.52
EW H1	PFO	Riparian	20	4.09
EW I	PFO	Riparian	37	2.77
EW J	PFO	Riparian	15	3.81
EW K	PSS1C	Non-riparian	25	1.69
EW L	PSS1C	Non-riparian	23	1.00
EW M	PF01C	Riparian	19	5.86
EW N	PFO	Non-riparian	15	0.04
EW O	PUB4C	Non-riparian	20	0.43
EW P	PUB4C	Non-riparian	20	0.39
EW Q	PUB4C	Non-riparian	20	0.07
EW R	PUB4C	Non-riparian	20	0.44
EW S	PUB4C	Non-riparian	20	0.13
FW A	PFO	Non-riparian	30	2.50
FW B	PFO	Riparian	20	9.85
FW C <sup>4</sup>	PFO	Non-riparian	48	21.50
		Riparian		11.18
FWD	PSS3B	Non-riparian	28	32.25
FW F	PFO	Non-riparian	37	20.91
		Riparian		2.69
FW H	PFO	Non-riparian	33	0.86
FW HA	PFO	Non-riparian	29	2.11
FW HB	PFO	Non-riparian	24	0.48
FW HC	PFO	Non-riparian	24	0.73
FW I	PFO	Non-riparian	17	1.25
FW J	PFO	Non-riparian	17	0.60
FW K	PFO	Non-riparian	17	1.12
FW L	PFO	Non-riparian	19	1.10
FW X	PFO	Non-riparian	31	0.15
FW Y	PFO	Non-riparian	20	1.01
GWA	PEM/PSS	Riparian	61	25.15

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
GWB <sup>5</sup>	PSS	Non-riparian	32	18.99
GWC	PFO	Non-riparian	32	138.14
GWD	PFO	Non-riparian	32	19.74
		Riparian		3.13
GWF	PFO	Riparian	19	0.02
GWH	PFO	Riparian	54	0.26
GWZ	PSS	Non-riparian	19	0.41
HBAA <sup>6</sup>	PSS/PFO	Riparian	32	2.29
HBAB	PSS/PFO	Non-riparian	27	4.13
HBWA	PFO	Riparian	32	0.69
HBWB	PSS/PFO	Riparian	32	0.08
HBWD	PSS/PFO	Riparian	83	59.92
HBWE	PSS	Riparian	32	0.05
HBWF	PEM/PSS	Riparian	32	5.42
HBWG	PSS/PFO	Non-riparian	32	3.01
		Riparian		1.68
HBWH	PFO	Non-riparian	20	0.43
HBWH2	PFO	Non-riparian	20	0.11
HBWH3	PFO	Non-riparian	20	0.03
HBWI	PSS/PFO	Riparian	32	0.74
HBWK <sup>7</sup>	PFO/PSS	Riparian	83	72.63
HBWL	PFO/PSS	Non-riparian	18	0.28
HBWM	PFO/PSS	Non-riparian	18	0.23
HBWN	PFO	Non-riparian	18	0.11
HBWO	PSS	Non-riparian	14	1.14
HBWQ	PFO	Non-riparian	18	0.04
HBWR	PSS/PFO	Non-riparian	18	0.43
HBWS	PFO/PSS	Non-riparian	18	0.48
HBWT	PSS	Non-riparian	14	0.39
HBWV	PSS	Non-riparian	14	0.15
HBWX	PSS/PFO	Non-riparian	14	0.06
HBWY	PSS/PFO	Non-riparian	32	0.06
HWA	PFO	Riparian	21	1.80
HWB	PFO	Riparian	50	10.53
HWC	PSS	Non-riparian	15	0.15

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
HWD	PFO	Non-riparian	21	1.50
HWE	PFO/PSS	Non-riparian	27	13.84
HWF	PFO/PSS	Non-riparian	15	0.35
HWG <sup>8</sup>	PFO/PSS	Riparian	15	8.20
		Non-riparian		1.64
HWH	PFO	Non-riparian	26	0.15
HWH1	PFO	Non-riparian	26	0.09
HWH2	PFO	Non-riparian	26	0.03
HWH3	PFO	Non-riparian	26	0.07
HWH4	PFO	Non-riparian	26	0.02
HWH5	PFO	Non-riparian	26	0.23
HWH6	PFO	Non-riparian	26	0.10
HWI	PFO	Non-riparian	26	0.02
HWJ	PFO	Non-riparian	26	0.03
HWK	PFO	Non-riparian	26	1.05
HWL	PFO	Non-riparian	26	0.32
HWL1	PFO	Non-riparian	26	0.06
HWP	PSS	Non-riparian	26	0.26
HWR	PFO	Riparian	51	0.09
HWS	PFO	Riparian	44	2.53
HWT	PFO	Non-riparian	15	0.24
HWU	PFO	Non-riparian	15	0.00
HWV	PFO/PSS	Non-riparian	38	0.07
HWY	PFO	Non-riparian	26	0.33
HWZ	PFO	Non-riparian	21	0.66
HWAA <sup>9</sup>	PFO	Non-riparian	40	123.09
		Riparian		11.02
HWCC	PFO	Non-riparian	25	0.04
HWDD	PFO	Non-riparian	25	0.10
HWEE	PFO	Riparian	25	0.56
HWFF	PFO/PSS	Riparian	34	1.49
HWGG	PSS	Riparian	34	1.39
HWHH	PFO	Non-riparian	34	1.57
HWJJ	PFO	Riparian	34	1.86
HWKK	PFO	Non-riparian	21	0.92

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
HWMM <sup>10</sup>	PFO	Non-riparian	36	19.77
		Riparian		1.37
HWMX	PFO	Non-riparian	40	1.19
IWA	PFO	Riparian	80	2.78
IWA_MM	PFO	Non-riparian	39	22.78
IWB	PFO	Riparian	25	1.62
IWC	PFO	Riparian	20	0.49
IWD	PFO	Non-riparian	31	31.30
		Riparian		2.13
IWE	PFO	Non-riparian	13	0.16
IWF <sup>11</sup>	PFO	Riparian	69	15.86
		Non-riparian		6.70
IWG_CC1	PFO	Non-riparian	41	0.94
IWG_CC2	PFO	Non-riparian	41	0.44
IWG_CC3	PFO	Non-riparian	41	0.99
IWH <sup>12</sup>	PFO	Non-riparian	53	19.26
		Riparian		3.83
IWJ	PFO	Non-riparian	10	2.85
IWK	PFO	Riparian	77	20.43
		Non-riparian		6.00
IWL	PFO	Riparian	33	1.75
IWM	PFO	Non-riparian	11	4.15
IWN	PFO	Riparian	79	40.49
IWO	PFO	Non-riparian	7	0.16
IWP	PFO	Non-riparian	15	0.13
IWQ	PFO	Non-riparian	7	0.64
IWS	PFO	Non-riparian	10	1.30
IWT <sup>13</sup>	PFO	Non-riparian	41	56.09
		Riparian		9.16
IWU	PFO	Non-riparian	13	0.45
IWV	PFO	Non-riparian	42	13.77
IWW	PFO	Non-riparian	45	43.84
JWA	PFO	Non-riparian	4	0.04
JWB	PFO	Non-riparian	7	0.01
JWC	PFO	Non-riparian	14	0.39

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
JWD	PFO	Non-riparian	22	3.67
		Riparian		2.18
JWG	PFO	Riparian	15	0.94
JWH	PFO	Riparian	34	0.08
JWI	PFO	Riparian	26	5.87
JWJ	PFO	Non-riparian	35	1.02
JWK	PFO	Non-riparian	14	0.42
JWKX <sup>2</sup>	Non-Riverine Swamp Forest <sup>3</sup>	Non-riparian	14	1.90
JWL	PFO	Non-riparian	22	0.38
JWM	PFO	Non-riparian	9	0.79
JWN	PFO	Riparian	6	0.52
JWO	PFO	Non-riparian	12	0.24
JWP	PFO	Riparian	13	0.38
JWQ	PFO	Riparian	82	3.57
JWR	PFO	Riparian	10	0.09
JWS	PFO	Riparian	69	2.06
JWT	PFO	Riparian	73	2.27
JWU	PFO	Riparian	26	0.68
KWA	PFO3/4B	Non-riparian	30	24.46
KWB	PFO1/2C	Non-riparian	22	3.19
KWC	PFO1/2C	Non-riparian	17	11.77
KWD	PFO4A	Non-riparian	26	19.49
KWE	PFO4Bd	Non-riparian	19	5.77
KWF	PFO/PSS	Non-riparian	45	29.15
KWG	PFO1/2G	Non-riparian	43	13.05
KWH <sup>14</sup>	PFO1/2C	Non-riparian	42	17.50
KWI	PFO1/3/4B	Non-riparian	49	139.44
KWN	PFO4B	Non-riparian	46	80.96
KWO	PFO4B	Non-riparian	37	28.95
KWS	PFO1/4B	Non-riparian	33	4.11
KWST	PFO2/4Eg	Non-riparian	39	0.10
LWA	PFO	Riparian	70	5.80
LWB	PFO	Riparian	72	12.09
LWC <sup>15</sup>	PFO	Non-riparian	30	1.72
LWD	PFO	Riparian	83	18.98

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
LWD1	PFO	Riparian	48	0.08
LWE	PFO	Non-riparian	29	24.36
LWF	PFO	Non-riparian	11	0.28
LWG	PFO	Non-riparian	46	1.04
LWH	PFO	Non-riparian	23	0.20
LWI	PFO	Riparian	80	15.79
LWJ	PFO	Non-riparian	40	44.05
LWJA	PFO	Non-riparian	21	0.16
LWK	PFO	Non-riparian	78	8.11
		Riparian		6.17
LWL	PFO	Riparian	76	4.94
MWA <sup>16</sup>	PSS/PFO	Non-riparian	36	17.95
MWC	PFO4	Non-riparian	31	59.18
MWE	PFO/PSS	Non-riparian	30	9.43
MWF	PFO	Non-riparian	19	7.66
MWG	PFO/PSS	Non-riparian	20	0.32
MWH <sup>17</sup>	PFO	Non-riparian	33	70.31
MWI	PFO4	Non-riparian	20	0.03
MWJ	PFO	Non-riparian	33	31.44
MWK	PFO4	Non-riparian	20	0.57
MWL	PFO	Riparian	68	18.08
		Non-riparian		9.04
MWM(1)	PFO	Non-riparian	25	28.79
MWM(2)	PFO	Riparian	68	14.31
		Non-riparian		11.95
MWN(1)	PFO	Riparian	25	0.10
MWN(2)	PFO	Non-riparian	21	0.13
MWX	PFO	Non-riparian	25	1.63
MWY	PFO	Riparian	25	1.41
MWZ	PFO	Non-riparian	25	4.73
MWAA	PFO	Non-riparian	25	6.33
NWA	PFO	Non-riparian	12	0.63
NWB	PEM/PFO	Non-riparian	13	3.72
NWC	PEM/PFO	Non-riparian	12	0.18
NWD	PSS	Non-riparian	12	1.28

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

<b>Wetland ID</b>	<b>Cowardin Classification<sup>1</sup></b>	<b>Hydrologic Classification</b>	<b>NCDWR Wetland Rating</b>	<b>Wetland Area in Study Area (acres)</b>
NWE	PEM/PFO	Non-riparian	12	3.18
NWF	PEM/PSS	Non-riparian	12	0.35
NWG	PEM	Non-riparian	12	0.01
NWH	PEM	Non-riparian	12	0.09
NWI	PEM	Non-riparian	12	0.03
NWJ	PSS/PFO	Non-riparian	12	0.22
NWK	PSS	Non-riparian	12	2.23
NWL	PSS	Riparian	50	2.89
NWM	PFO	Non-riparian	22	4.07
NWN	PFO4A	Non-riparian	12	1.64
NWO	PFO4	Non-riparian	17	5.01
NWP	PSS	Non-riparian	17	104.38
NWQ	PSS	Riparian	12	0.48
NWS	PSS	Non-riparian	17	3.30
ZWA	PFO	Non-riparian	19	0.44
ZWB	PFO	Non-riparian	23	1.89
ZWC	PEM	Non-riparian	26	2.10
ZWD	PFO	Non-riparian	16	1.13
ZWE	PSS	Non-riparian	21	3.65
ZWF	PSS	Non-riparian	16	0.51
ZWG	PSS	Non-riparian	24	2.08
ZWH	PFO	Non-riparian	20	0.11
ZWJ	PFO	Non-riparian	26	1.69
ZWK	PEM	Non-riparian	16	0.08
ZWL	PFO	Non-riparian	20	0.24
ZWM	PFO	Non-riparian	20	0.04
ZWO	PFO	Non-riparian	22	1.10
ZWP	PFO	Non-riparian	20	0.54
ZWQ	PSS	Riparian	40	0.70
ZWS	PFO	Non-riparian	36	15.99
ZWT	PFO	Non-riparian	16	1.18
ZWU	PFO	Non-riparian	16	0.12
ZWV	PFO	Riparian	39	0.17
ZWW	PFO	Riparian	23	1.16
ZWX	PFO	Riparian	16	0.30
ZWY	PFO	Non-riparian	10	0.08



Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
ZWZ	PFO	Riparian	34	0.10
ZWAA	PFO	Non-riparian	22	0.79
ZWBB	PFO	Riparian	40	1.44
ZWCC	PFO	Riparian	28	0.85
ZWDD	PFO	Non-riparian	26	6.69
		Riparian		1.46
ZWDDX <sup>2</sup>	Pine Flat <sup>3</sup>	Non-riparian	26	0.10
ZWGG	PSS	Non-riparian	16	12.32
ZJWMM	PFO	Riparian	30	1.22
PD-01 <sup>18</sup>	PFO/PSS	Non-riparian	N/A	1.41
PD-02	PFO/PSS	Non-riparian	N/A	0.23
PD-03	PFO/PSS	Non-riparian	N/A	32.37
PD-04	PFO/PSS	Non-riparian	N/A	25.49
PD-05	PFO/PSS	Non-riparian	N/A	0.14
PD-06	PFO/PSS	Riparian	N/A	1.36
PD-07	PFO/PSS	Riparian	N/A	0.10
PD-08	PFO/PSS	Riparian	N/A	0.03
PD-09	PFO/PSS	Non-riparian	N/A	0.39
PD-10	PFO/PSS	Non-riparian	N/A	0.72
PD-11	PFO/PSS	Non-riparian	N/A	0.70
PD-12	PFO/PSS	Non-riparian	N/A	0.15
PD-13	PFO/PSS	Non-riparian	N/A	0.43
PD-14	PFO/PSS	Non-riparian	N/A	0.53
PD-15	PFO/PSS	Non-riparian	N/A	0.53
PD-16	PFO/PSS	Non-riparian	N/A	0.63
PD-17	PFO/PSS	Non-riparian	N/A	22.81
		Riparian		5.58
PD-18	PFO/PSS	Non-riparian	N/A	1.73
PD-19	PFO/PSS	Non-riparian	N/A	0.41
PD-20	PFO/PSS	Non-riparian	N/A	0.01
PD-21	PFO/PSS	Non-riparian	N/A	0.43
PD-22	PFO/PSS	Non-riparian	N/A	0.02
PD-23	PFO/PSS	Non-riparian	N/A	0.51
PD-24	PFO/PSS	Non-riparian	N/A	7.52
PD-25	PFO/PSS	Non-riparian	N/A	46.30
PD-26	PFO/PSS	Non-riparian	N/A	0.04

Table 3-10. Jurisdictional Characteristics of Wetlands within the Study Area *continued*

Wetland ID	Cowardin Classification <sup>1</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Area in Study Area (acres)
PD-27	PFO/PSS	Riparian	N/A	3.34
PD-28	PFO/PSS	Non-riparian	N/A	0.28
PD-29	PFO/PSS	Non-riparian	N/A	28.36
PD-30	PFO/PSS	Non-riparian	N/A	2.89
PD-31	PFO/PSS	Non-riparian	N/A	17.84
PD-32	PFO/PSS	Non-riparian	N/A	3.86
		Riparian		1.59
PD-33	PFO/PSS	Non-riparian	N/A	8.17
		Riparian		1.98
PD-34	PFO/PSS	Non-riparian	N/A	2.93
PD-35	PFO/PSS	Non-riparian	N/A	9.84
PD-36	PFO/PSS	Non-riparian	N/A	0.15
PD-37	PFO/PSS	Non-riparian	N/A	2.90
PD-38	PFO/PSS	Non-riparian	N/A	1.63
12WA	Headwater Forest <sup>3</sup>	Riparian	51	0.10

<sup>1</sup>Cowardin classifications are based on characteristics of each wetland at the specific time and location of observation. Wetlands having 'No ID' were not characterized due to impacted appearance at the time of observation.

<sup>2</sup>Wetlands with an "X" at the end of the Wetland ID are wetlands identified in the extended study areas that are extensions of wetlands previously identified in the DEIS.

<sup>3</sup>NCWAM classification was used for wetlands in extended study areas.

<sup>4</sup>Includes wetland FWE.

<sup>5</sup>Includes wetland ZGWB.

<sup>6</sup>Includes wetland HBAC.

<sup>7</sup>Includes wetland HBWP.

<sup>8</sup>Includes wetlands HWM, HWN, HWO.

<sup>9</sup>Includes wetlands HWBB, HWII, HWLL.

<sup>10</sup>Includes HWW.

<sup>11</sup>Includes wetland IWG.

<sup>12</sup>Includes wetland IWL.

<sup>13</sup>Includes wetlands IWR.

<sup>14</sup>Includes wetlands KWJ, KWK, KWL.

<sup>15</sup>Includes wetland MWO.

<sup>16</sup>Includes wetland NWR.

<sup>17</sup>Includes wetlands MWH(2-8).

<sup>18</sup>Delineation data previously verified; no NCDWR wetland rating forms completed for these wetlands.

### 3.5.4 JURISDICTIONAL ISSUES

#### 3.5.4.1 WATERS OF THE UNITED STATES

Section 404 of the Clean Water Act requires regulation of discharges into "Waters of the United States." The US Environmental Protection Agency (USEPA) is the principal administrative agency of the Clean Water Act; however, USACE has the responsibility for implementation, permitting, and enforcement of the provisions of the Act. The USACE regulatory program is defined in 33 CFR 320-330.

Surface waters (lakes, rivers, and streams) and wetlands are subject to jurisdictional consideration under the Section 404 program. Any action that proposes to place fill into these areas falls under the jurisdiction of USACE under Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 401 of the Clean Water Act grants authority to individual states for regulation of discharges into “Waters of the United States.” Under North Carolina General Statutes, 113A “Pollution Control and Environment” and codified in NCAC 15A, NCDWR has the responsibility for implementation, permitting, and enforcement of the provisions of the Act.

#### **3.5.4.2 BUFFER AREAS**

Streams within the study area are part of the Cape Fear and Onslow Bay River Basins. Therefore, no North Carolina River Basin Buffer Rules apply to streams within the study area.

#### **3.5.4.3 PROTECTED SPECIES**

Some populations of fauna and flora have been, or are in the process of decline due to either natural forces or their inability to coexist with humans. Federal law (under the provisions of Section 7 of the Endangered Species Act [ESA] of 1973, as amended) requires that any action likely to adversely affect a species classified as federally-protected be subject to review by the US Fish and Wildlife Service (USFWS). Prohibited actions which may affect any species protected under the ESA are outlined in Section 9 of the Act.

Species which are listed, or are proposed for listing, as endangered (E) or threatened (T) are recorded in Section 4 of the ESA. As defined by the ESA, an endangered species is any plant or animal which is in danger of extinction throughout all or a significant portion of its range within the foreseeable future. A threatened species is any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

As of January 24, 2014, USFWS lists 12 federally-protected species for New Hanover County and 13 federally-protected species for Pender County (Table 3-11). As of January 24, 2014, USFWS does not list any candidate species for New Hanover or Pender Counties. Habitat requirements for each species are based on the current best available information as per referenced literature and USFWS correspondence. The additional study area discussed in Section 3.5 does not affect the DEIS conclusions with respect to the presence of suitable habitat for any of the federally-protected species for New Hanover and Pender Counties.

Table 3-11. Federally-Protected Species Listed for New Hanover &amp; Pender Counties

Scientific Name	Common Name	Federal Status	Habitat Present	County
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	Yes	New Hanover Pender
<i>Chelonia mydas</i>	Green sea turtle	T	No	New Hanover Pender
<i>Caretta caretta</i>	Loggerhead sea turtle	T	No	New Hanover Pender
<i>Charadrius melodus</i>	Piping plover	T	No	New Hanover Pender
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	Yes	New Hanover Pender
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	E	No	New Hanover Pender
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	E	No	New Hanover Pender
<i>Trichechus manatus</i>	West Indian manatee	E	No	New Hanover Pender
<i>Schmalbea americana</i>	American chaffseed <sup>1</sup>	E	Yes <sup>1</sup>	Pender
<i>Thalictrum cooleyi</i>	Cooley's meadowrue	E	Yes	New Hanover Pender
<i>Carex lutea</i>	Golden sedge <sup>2</sup>	E	Yes <sup>2</sup>	New Hanover <sup>2</sup> Pender
<i>Lysimachia asperulaefolia</i>	Rough-leaved loosestrife	E	Yes	New Hanover Pender
<i>Amaranthus pumilus</i>	Seabeach amaranth	T	No	New Hanover Pender

E – Endangered                      T – Threatened                      T(S/A) - Threatened due to Similarity of Appearance

<sup>1</sup>Historic record (the species was last observed in the county more than 50 years ago).

<sup>2</sup>Golden sedge status is “Probable/Potential” for New Hanover County. This species is considered likely to occur in New Hanover County based on presence of Cooley's meadowrue.

### American alligator

In North Carolina, alligators have been recorded in nearly every coastal county and many inland counties to the fall line. The alligator is found in rivers, streams, canals, lakes, swamps, and coastal marshes. Adult animals are highly tolerant of salt water, but the young are apparently more sensitive, with salinities greater than five parts per thousand considered harmful. The American alligator remains on the protected species list due to its similarity in appearance to the endangered American crocodile.

Suitable habitat is present for American alligator within the study area.

### **Green sea turtle**

The green sea turtle is found in temperate and tropical oceans and seas. These turtles require beaches with minimal disturbances and a sloping platform for nesting, so nesting by this species in North America is primarily limited to small communities on the east coast of Florida. However, they also sporadically nest in North Carolina in small numbers. The green sea turtle can be found in shallow waters. They are attracted to lagoons, reefs, bays, mangrove swamps, and inlets where an abundance of marine grasses can be found, as this is the principle food source for the green sea turtle.

Suitable habitat for the green sea turtle does not exist within the study area.

### **Loggerhead sea turtle**

The loggerhead is widely distributed within its range, and is found in three distinct habitats during their lives. These turtles may be found hundreds of miles out in the open ocean, in nearshore areas, or on coastal beaches. In North Carolina, this species has been observed in every coastal county. Loggerheads frequently nest on North Carolina beaches, and are the most common of all the sea turtles that visit the North Carolina coast. They nest nocturnally, at two to three year intervals, between May and September, on isolated beaches that are characterized by fine-grained sediments. In nearshore areas, loggerheads have been observed in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and shipwrecks are often used as foraging areas.

Suitable habitat for the loggerhead sea turtle does not exist within the study area.

### **Piping plover**

The piping plover breeds along the entire eastern coast of the United States. North Carolina is the only state where the piping plover's breeding and wintering ranges overlap and the birds are present year-round. They nest most commonly where there is little or no vegetation, but some may nest in stands of beachgrass. The nest is a shallow depression in the sand that is usually lined with shell fragments and light-colored pebbles.

Suitable habitat for piping plover does not exist within the study area.

### **Red-cockaded woodpecker**

The red-cockaded woodpecker (RCW) typically occupies open, mature stands of southern pines, particularly longleaf pine (*Pinus palustris*), for foraging and nesting/roosting habitat. The RCW excavates cavities for nesting and roosting in living pine trees, aged 60 years or older, and which are contiguous with pine stands at least 30 years of age to provide foraging habitat. The foraging range of the RCW is normally no more than 0.5 mile.

Suitable RCW foraging and nesting/roosting habitat is present throughout the study area.

### **Shortnose sturgeon**

Shortnose sturgeon occur in most major river systems along the eastern seaboard of the United States. The species prefers the nearshore marine, estuarine, and riverine habitat of large river systems. It is an anadromous species that migrates to faster-moving freshwater areas to spawn in the spring, but spends most of its life within close proximity of the river's mouth. Large freshwater rivers that are unobstructed by dams or pollutants are imperative to successful reproduction.

Suitable habitat for shortnose sturgeon does not exist within the study area.

### **Atlantic sturgeon**

Atlantic sturgeon are anadromous; adults spawn in freshwater in the spring and early summer and migrate into estuarine and marine waters where they spend most of their lives. In some southern rivers a fall spawning migration may also occur. They spawn in moderately flowing water in deep parts of large rivers. It is likely that cold, clean water is important for proper larval development. Once larvae begin migrating downstream they use benthic structure (especially gravel matrices) as refuges. Juveniles usually reside in estuarine waters for months to years. Subadults and adults live in coastal waters and estuaries when not spawning, generally in shallow (10-50 meter depth) nearshore areas dominated by gravel and sand substrates. Long distance migrations away from spawning rivers are common.

Suitable habitat for Atlantic sturgeon does not exist within the study area.

### **West Indian manatee**

Manatees have been observed in all the North Carolina coastal counties. Manatees are found in canals, sluggish rivers, estuarine habitats, salt water bays, and as far off shore as 3.7 miles. They use freshwater and marine habitats at shallow depths of five to 20 feet. In the winter, between October and April, manatees concentrate in areas with warm water. During other times of the year, habitats appropriate for the manatee are those with sufficient water depth, an adequate food supply, and in proximity to freshwater. Manatees require a source of freshwater to drink. Manatees are primarily herbivorous, feeding on any aquatic vegetation present, but they may occasionally feed on fish.

Suitable habitat for West Indian manatee does not exist within the study area.

### **American chaffseed**

American chaffseed generally occurs in habitats described as open, moist to dryish mesic pine flatwoods and longleaf pine flatlands, pine savannas, and other open grass/sedge-dominated communities. This herb also occurs in the ecotonal areas between peaty wetlands and xeric sandy soils and on the upper ecotones of, or sites close to, streamhead pocosins. The species prefers sandy peat or sandy loam, acidic, seasonally moist to dry soils in sunny or partly sunny areas subject to frequent fires in the growing season. The plant is dependent on factors such as fire, mowing, or fluctuating water tables to maintain its required open to partly-open habitat. Most extant populations, and

all of the most vigorous populations, are in areas subject to frequent fire. This species is also known to occur on road cuts and power line rights-of-way that experience frequent mowing or clearing. Soil series that it is found on include Blaney, Candor, Gilead, Fuquay, Lakeland, and Vacluse.

Suitable habitat for American chaffseed is present within the study area.

### **Cooley's meadowrue**

Cooley's meadowrue, documented in the pine savanna natural community, occurs in circumneutral soils in sunny, moist to wet grass-sedge bogs, wet-pine savannas over calcareous clays, and savanna-like areas, often at the ecotones of intermittent drainages or non-riverine swamp forests. This rhizomatous perennial herb is also found along plowed firebreaks, roadside ditches and rights-of-way, forest clearings dominated by grass or sedge, and power line or utility rights-of-way. The species requires some type of disturbance (e.g., mowing, clearing, periodic fire) to maintain its open habitat. The plant typically occurs on slightly acidic (pH 5.8-6.6) soils that are loamy fine sand, sandy loam, or fine sandy loam; at least seasonally moist or saturated; and mapped as Foreston, Grifton, Muckalee, Torhunta, or Woodington series. Atlantic white cedar, tulip poplar, golden sedge, and bald and pond cypress are a few of its common associate species.

Suitable habitat for Cooley's meadowrue is present within the study area.

### **Golden sedge**

Golden sedge grows in sandy soils overlying calcareous deposits of coquina limestone, where the soil pH, typically between 5.5 and 7.2, is unusually high for this region. This perennial prefers the ecotone between the pine savanna and adjacent wet hardwood or hardwood/conifer forest. Most plants occur in the partially shaded savanna/swamp where occasional to frequent fires favor an herbaceous ground layer and suppress shrub dominance. Soils supporting the species are very wet to periodically shallowly inundated. The plant can occur in disturbed areas, such as roadside and drainage ditches or power line rights-of-way, where mowing and/or very wet conditions suppress woody plants. Poorly viable populations may occur in significantly disturbed areas where ditching activities that lower the water table and/or some evidence of fire suppression threatens the species. Tulip poplar, pond cypress, red maple, wax myrtle, colic root, and Cooley's meadowrue are a few of its associate species.

Suitable habitat for golden sedge is present within the study area.

### **Rough-leaved loosestrife**

Rough-leaved loosestrife generally occurs in the ecotones or edges between longleaf pine uplands and pond pine pocosins in dense shrub and vine growth on moist to seasonally saturated sands and on shallow organic soils overlaying sand (spodosolic soils). Occurrences are found in such disturbed habitats as roadside depressions, maintained power and utility line rights-of-way, firebreaks, and trails. The species prefers full sunlight, is shade intolerant, and requires areas of disturbance (e.g., clearing, mowing, and

periodic burning) where the overstory is minimal. It can, however, persist vegetatively for many years in overgrown, fire-suppressed areas. Blaney, Gilead, Johnston, Kalmia, Leon, Mandarin, Murville, Torhunta, and Vaucluse are some of the soil series that occurrences have been found on.

Suitable habitat for rough-leaved loosestrife is present within the study area.

#### **Seabeach amaranth**

Seabeach amaranth occurs on barrier island beaches where its primary habitat consists of overwash flats at accreting ends of islands, lower foredunes, and upper strands of noneroding beaches (landward of the wrack line). In rare situations, this annual is found on sand spits 160 feet or more from the base of the nearest foredune. It occasionally establishes small temporary populations in other habitats, including sound-side beaches, blowouts in foredunes, interdunal areas, and on sand and shell material deposited for beach replenishment or as dredge spoil. The plant's habitat is sparsely vegetated with annual herbs (forbs) and, less commonly, perennial herbs (mostly grasses) and scattered shrubs. It is, however, intolerant of vegetative competition and does not occur on well-vegetated sites. The species usually is found growing on a nearly pure silica sand substrate, occasionally with shell fragments mixed in. Seabeach amaranth appears to require extensive areas of barrier island beaches and inlets that function in a relatively natural and dynamic manner. These characteristics allow it to move around in the landscape, occupying suitable habitat as it becomes available.

Suitable habitat for seabeach amaranth does not exist within the study area.

#### **3.5.4.4 BALD EAGLE AND GOLDEN EAGLE PROTECTION ACT**

The bald eagle was declared recovered, and removed (de-listed) from the Federal List of Threatened and Endangered Species effective August 8, 2007. The bald eagle remains federally-protected under the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668d). The Eagle Act prohibits take of bald and golden eagles and provides a statutory definition of "take" that includes "disturb".

Habitat for the bald eagle primarily consists of mature forest in proximity to large bodies of open water for foraging. Large, dominant trees are used for nesting sites, typically within one mile of open water. Potential foraging habitat for bald eagle exists within the study area in the form of a large, open water cypress swamp immediately south of Sidbury Road. This area was delineated as a wetland during field investigations and is shown on Figure 10F as wetland GWA. The open water component of wetland GWA extends beyond the study area and encompasses approximately 17 acres. During field investigations in 2008, two independent sightings of an adult bald eagle were observed in the area of wetland GWA.



#### **3.5.4.5 ESSENTIAL FISH HABITAT**

The National Marine Fisheries Service (NMFS) has developed fishery management plans for Essential Fish Habitats (EFH) in various Waters of the United States. The management plans are directed towards maintaining functioning, profitable commercial fishery populations with a long-term recommendation of “no net loss” of existing habitat. The South Atlantic Region has developed mapping depicting in-land primary and secondary nursery areas for certain commercial species. A review of North Carolina Division of Marine Fisheries (NCDMF) maps in July 2010 did not indicate any anadromous fish spawning areas, shellfish growing areas, or primary nursery areas present within the study area. Reviews of NMFS data conducted in August 2012 and October 2013 also indicated there is no designated EFH within the extended study areas.

#### **3.5.4.6 AREAS OF ENVIRONMENTAL CONCERN**

An on-site field meeting was held in May 2010 with the North Carolina Division of Coastal Management (NCDCM) to review the potential for Areas of Environmental Concern (AEC) within the study area. At the field review it was determined that no Coastal Area Management Act (CAMA) AECs are present within the study area. In addition, there are no CAMA AECs within the extended study areas.

#### **3.5.4.7 ANADROMOUS FISH HABITAT**

Anadromous fish are species that spend their adult lives in the ocean but return to freshwater habitats to reproduce. A review of NCDMF maps in July 2010 and March 2014 determined no anadromous fish spawning areas are present within the study area.

Harrisons Creek and Island Creek are designated as inland waters under the jurisdiction of the North Carolina Wildlife Resources Commission (NCWRC).

#### **3.5.4.8 SUBMERGED AQUATIC VEGETATION**

There is no submerged aquatic vegetation present within the study area.



## **4.0 ENVIRONMENTAL CONSEQUENCES**

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This chapter identifies the beneficial and adverse social, economic, and environmental consequences of the DEIS detailed study alternatives and NCDOT's preferred alternative as described in Chapter 2. The environmental consequences of the proposed project discussed in this chapter are based on the human and natural environmental resources within the study area, or alternative corridors, which were identified in Chapter 3. As discussed previously, the impacts identified for NCDOT's preferred alternative are based on the revised preliminary design including the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date.

Extended study areas totaling approximately 25.0 acres were added to the project in April 2012. These extended areas are associated with portions of NCDOT's preferred alternative corridor that extend outside of the project study area identified in the 2011 DEIS. Extended study areas totaling approximately 46.9 acres also were added to the project in August 2013. These extended areas account for portions of three of the potential service roads (SR3, SR8, and SR16) that extend slightly outside of the 2011 DEIS project study area, as well as the proposed Lendire Road improvements. The descriptions of the existing conditions and characteristics of the study area included in this chapter have been updated since the 2011 DEIS, as needed, to reflect the addition of these extended study areas.

### **4.1 HUMAN ENVIRONMENT IMPACTS**

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#### **4.1.1 COMMUNITY IMPACTS**

Community cohesion in most of the study area is not expected to be impacted by either the proposed Military Cutoff Road Extension or the proposed US 17 Hampstead Bypass. However, in small focused areas, some changes are expected. The most likely areas to experience change would be in the vicinity of the proposed Hampstead Bypass interchange at NC 210. This area is characterized by rural residential development, with a few nearby businesses. The stability of the rural community in these areas could be affected by people potentially moving away if they don't feel that the new interchange is compatible with their community.

Since Military Cutoff Road Extension will be limited control of access, it will provide alternative access points to some neighborhoods north of Ogden Park. Access to existing commercial properties generally would be maintained, though the pattern of access may change.

Development patterns may be affected by the Hampstead Bypass alternatives in areas where new access is provided. It is expected that the market for development may shift somewhat along NC 210 to include higher intensity residential uses and potentially business uses clustered around the proposed interchange.

The proposed interchange north of the Topsail Schools complex is located on property included in Bayberry Farms development plans. US 17 Hampstead Bypass alternatives impact planned access points from existing US 17. One of the ten proposed service roads discussed in Section 2.8.5 (SR14) provides access to the proposed development from Hoover Road (see Figures 16F and 16G). All of the Hampstead Bypass alternatives will cross the area proposed for mixed-use development near Sidbury Road (formerly the proposed East Haven development).

The project design will realign existing US 17 just south of Grandview Drive and extend existing US 17 on new location to connect with the proposed US 17 Hampstead Bypass at a trumpet interchange (see Figure 17). The realigned roadway will impact a commercial center with five businesses on existing US 17. Existing US 17 from just south of Grandview Drive to north of the Topsail Schools complex near Leeward Lane will be converted into a local road.

The project design for the detailed study alternatives presented in the DEIS did not provide a connection to the bypass for existing US 17 north of the schools. As discussed previously, an additional interchange is now proposed north of the Topsail Schools complex. The proposed interchange north of the schools will provide additional access to existing US 17.

As stated in DEIS Section 4.1.1 and in SDEIS Section 5.2.1, it is anticipated through traffic along existing US 17 through Hampstead will be transferred to the US 17 Hampstead Bypass. It is anticipated through traffic will continue to use the proposed bypass, even with the addition of the interchange north of the Topsail Schools complex. However, the additional access provided by the interchange will reduce travel time for those using existing US 17 in front of the schools.

Some local traffic patterns will change. Traffic volumes along existing US 17 south of the proposed interchange near Grandview Drive are expected to remain high. However, businesses that rely on drive-by traffic would likely see a reduction in those customers. For local traffic remaining on existing US 17, the resulting reduced traffic delays and proposed interchange north of the schools should improve accessibility to businesses. Development patterns are not expected to be affected by the additional access. Public hearing comments strongly indicated a preference for this improved accessibility.

The 2007 Pender County Collector Street Plan recommends a “village boulevard” cross section for existing US 17 in the Hampstead area. This concept would include a landscaped median and buffers, pedestrian and bicycle facilities, and improved access management. Removal of through traffic and restricted accessibility to existing US 17 through Hampstead will help support this local vision of a pedestrian-friendly, main street-type facility.

Population growth in New Hanover County and the Demographic Area is forecasted to exceed the state’s rate in the coming decades. Population growth in Pender County is forecasted to exceed or match the state’s rate. Local plans and zoning are in place to

guide anticipated growth. Future land use maps and zoning maps show that growth is expected along the US 17 corridor and major adjoining roads, including NC 210. Both Military Cutoff Road Extension and the Hampstead Bypass have been included in local growth projections. It is anticipated neither project would substantially alter growth beyond what is already expected by local planners. Growth, particularly along existing roadways such as US 17, is expected to continue with or without these projects.

#### **4.1.2 COMMUNITY FACILITIES AND SERVICES**

A ramp for the interchange north of the Topsail Schools complex (Topsail High School, Middle School, and Elementary School) will cross a portion of the school property behind the athletic fields. All of the alternatives will displace the wastewater treatment package plant used by the Topsail Schools complex. As discussed in Section 3.3.4, Pender County plans to expand sewer services in the area of the schools; however, funding availability makes the timing of improvements uncertain. NCDOT will coordinate with the Pender County School System regarding impacts to the wastewater treatment facility resulting from the proposed project during the project's right-of-way phase.

A Pender County recycling center and water tower are located along US 17 adjacent to the Topsail Schools. All of the alternatives will affect the current access to the water tower and displace the recycling center. NCDOT will coordinate with Pender County regarding access to the water tower and relocation of the recycling center.

Traffic in front of the Topsail Schools complex will be slightly higher with the addition of an interchange north of the schools than it would have been with no access to the bypass north of the schools. However, as discussed in Section 2.8.1.2, existing US 17 in the vicinity of the school will operate acceptably with the two interchanges proposed at the northern end of the project and far better than under no-build conditions.

All of the Hampstead Bypass alternatives are adjacent to Holly Shelter Game Land. Direct impacts to the game land are not anticipated.

The Military Cutoff Road Extension alternatives follow the same alignment between the eastern and western portions of Ogden Park. The park boundary was designed to accommodate a transportation corridor and the proposed project does not cross park property. Military Cutoff Road Extension will be carried over Ogden Park Drive with a bridge and current access between the park sections will be maintained. Fences will be located along Military Cutoff Road Extension through the park area, which will prevent visitors from having direct access to Military Cutoff Road Extension from within the park. It is anticipated pedestrian access to existing multi-use path facilities and Ogden Park would be improved if pedestrian facilities are constructed. Views will be diminished equally by either Military Cutoff Road Extension alternative from Ogden Park. As vegetation is removed and replaced by asphalt, the roadway will change views in a portion of the park from a more intimate recreational setting to a more urban/disturbed environment.

Both of the Military Cutoff Road Extension alternatives will affect two cemeteries:

- Prospect Cemetery is located adjacent to Military Cutoff Road just south of its intersection with Market Street. The proposed project will affect a small area of the cemetery property; however, relocation of grave sites is not anticipated as a result of the proposed project. The DEIS indicated access to the cemetery would be impacted by Military Cutoff Road Extension alternatives and noted this would be further evaluated during final design. Since the DEIS, the preliminary design has been revised to provide access to Prospect Cemetery by a break in the proposed control of access at the existing driveway for the cemetery on Market Street.
- Mount Ararat AME Church, located at Market Street and Ogden Park Drive, has a cemetery adjacent to Market Street. Approximately 20-30 graves in this cemetery would be relocated by Alternatives M1 and M2. As discussed in Section 5.2.2, NCDOT, USACE, and the State Historic Preservation Office held a meeting with the minister and members of Mount Ararat AME Church on May 3, 2014 to discuss the proposed project's impacts on the church cemetery adjacent to Market Street.

Hampstead Bypass Alternative U would impact three cemeteries in the vicinity of the proposed interchange at Sidbury Road and Scotts Hill Loop Road: Pollocks Cemetery, McClammy and King Family Cemetery, and the Wesleyan Chapel United Methodist Church cemetery. In all, approximately 647 graves at these three cemeteries would be relocated with Alternative U. Hampstead Bypass Alternatives E-H, O, and R would not impact any cemeteries or require any graves to be relocated.

The DEIS stated Hampstead Bypass Alternatives E-H, O, and R will each result in the displacement of Saint Jude the Apostle Catholic Church and Angel Food Ministries. Design changes since the DEIS will avoid Saint Jude Church. Angel Food Ministries is no longer in operation. Hampstead Bypass Alternatives E-H, O, and R will impact Peoples Baptist Church on NC 210. Hampstead Bypass Alternative U will result in the displacement of five additional churches: St. Stephen AME Zion Church, Wesleyan Chapel United Methodist Church, Scotts Hill Baptist Church and Administrative Office, First Baptist Church, and "Old" Scotts Hill AME Zion Church. Hampstead Bypass Alternative U will result in the displacement of one pre-school (Creative Minds Pre-School).

The DEIS indicated all of the US 17 Hampstead Bypass alternatives would impact Topsail Baptist Church. The proposed project has been modified to provide access to Topsail Baptist Church.

Military Cutoff Road Extension alternatives would not result in the displacement of any churches.

#### **4.1.3 RELOCATION OF HOMES AND BUSINESSES**

All of the detailed study alternatives will result in the relocation of homes and businesses. Relocation reports were prepared for the DEIS detailed study alternatives and included

in Appendix C of the DEIS. The DEIS relocation reports included two non-profit organizations and a cemetery in the list of business impacts for Military Cutoff Road Extension alternatives. Table 4-1 below corrects this error for the DEIS detailed study alternatives. Scotts Hill Rosenwald School is also removed from the impacted businesses included for US 17 Hampstead Bypass Alternative U as the preliminary design was revised to avoid this historic resource. Updated relocation reports based on the revised preliminary design were prepared for NCDOT's preferred alternative. The updated relocation reports and information regarding NCDOT's Relocation Assistance Program are included in Appendix E. Total anticipated residential, business, and non-profit organization displacements for NCDOT's preferred alternative based on the updated relocation reports are also shown in Table 4-1. The number of minority-owned or occupied homes and businesses are shown in parentheses. One farm with on-site produce sales would be impacted by all of the alternatives.

Table 4-1. Residential, Business, and Non-Profit Relocations

	Alternative <sup>1</sup>				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
<b>Residential Relocations</b>	60 (3)	60 (11)	59 (13)	93 (36)	95 (36)
<b>Business Relocations<sup>2</sup></b>	35 (0)	76 (11)	76 (11)	91 (22)	91 (22)
<b>Non-Profit Relocations</b>	3 (1)	5	5	11	11

<sup>1</sup>Numbers in parentheses indicate minority-owned or occupied homes and businesses.

<sup>2</sup>Excludes three billboards and Pender County EMS, which are listed as businesses on the relocation report for R-3300. Pender County EMS is included under non-profit relocations.

Control of access was reduced for the preferred alternative along the west side of existing US 17 near the project's northern terminus to minimize impacts to a business and Topsail Baptist Church. The southeast quadrant of the Military Cutoff Road Extension and Market Street interchange was realigned to the west to minimize impacts to a residential area. Control of access was reduced along Market Street both north and south of the Military Cutoff Road Extension interchange to minimize impacts to properties on Market Street. Service Roads further reduced the relocation of homes and businesses (see Section 2.8.5). However, the construction of new homes in the project area has resulted in residential relocations not previously accounted for in the DEIS.

#### **4.1.4 ENVIRONMENTAL JUSTICE**

Title VI of the Civil Rights Act of 1964 protects individuals from discrimination on the grounds of race, age, color, religion, disability, sex, and national origin. Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs that “each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health and environmental effects of its programs, policies, and activities on minority populations and low-income populations.” Special populations may include the elderly, children, the disabled, low-income areas, American Indians, and other minority groups. Disproportionately high and adverse effects on minority and low-income populations are defined as adverse effects that are:

- Predominantly borne by a minority population and/or low-income population, or
- Will be suffered by a minority population and/or low-income population and are appreciably more severe or greater in magnitude than the adverse effects that will be suffered by the non-minority population and/or non-low-income population.

Census 2000 demographic data were collected and analyzed to determine if there were concentrations of minority persons and low-income persons. Block level data were used to evaluate minority statistics. Poverty statistics were obtained at the block group level, which is the smallest unit available from the US Census Bureau. The following blocks and block groups were evaluated:

##### New Hanover County

Tract 116.01 Block Group 1 Blocks 1000, 1038

Tract 116.04 Block Group 2 Blocks 2006, 2007, 2008, 2009, 2013, 2030, 2037

Tract 116.04 Block Group 3 Blocks 3000, 3048, 3049, 3050, 3051

Tract 117.01 Block Group 2 Blocks 2000, 2001

Tract 117.04 Block Group 1 Blocks 1009, 1013, 1014

Tract 117.04 Block Group 5 Blocks 5001, 5013, 5014, 5015, 5016

##### Pender County

Tract 9802 Block Group 2 Blocks 2081, 2085, 2087, 2097, 2098, 2099, 2103, 2104, 2105, 2109

Tract 9802 Block Group 3 Blocks 3000, 3001, 3006, 3007, 3008, 3009, 3015, 3024, 3025

Tract 9802, Block Group 5, Blocks 5000, 5002, 5008, 5031

For purposes of this evaluation, a minority block is defined as one in which the non-white population equals or exceeds twice the percentage of non-white persons in the county. Census 2000 data indicate there are five blocks that meet this criterion within the study area. All are located in New Hanover County. Four of the five blocks are located predominantly between the US 17 Wilmington Bypass and the New Hanover County line, with two found on each side of existing US 17. All project alternatives pass through the two blocks located on the north side of existing US 17. Military Cutoff Road Extension Alternatives M1 and M2 and Hampstead Bypass Alternatives E-H, O,



and R pass through largely undeveloped areas and do not result in any relocations within these census blocks. Alternative U would result in the relocation of approximately 12 homes, one church, a portion of a cemetery, and three businesses along Stephens Church Road. Alternative U also passes through the two minority blocks located on the south side of existing US 17 across from Stephens Church Road. Alternative U would result in the relocation of a church, one business, and approximately five houses in these two blocks.

The fifth census block meeting the criteria described above is located in the vicinity of the proposed Military Cutoff Road Extension interchange with Market Street. This area is predominantly commercial. It is anticipated Military Cutoff Road Extension Alternatives M1 and M2 would result in the relocation of two houses, two churches, and eight businesses in this census block.

There are no minority census blocks in the Pender County portion of the study area. The percentage of non-white persons in a large block located between existing US 17, NC 210, and Island Creek Road is just below the threshold of two times the County percentage. Because of the size of this block and the apparent lack of a concentration of minority persons (based on field review and discussions with local planners), it was not included as an area of environmental justice concern.

For the low-income assessment, a block group is considered low-income if the percentage of persons below the poverty level is at least two times the percentage of persons below poverty in the county. Census data did not indicate any concentrations of low-income persons within the study area. A windshield survey found there is housing typical of low-income persons within the study area. This housing is generally widely dispersed and includes individual homes and a few small clusters.

Planners in New Hanover and Pender Counties were contacted about potential locations of low-income and minority persons in the area most likely to be affected by the proposed project. Pender County contacts confirmed that there were no concentrations of low-income or minority persons within the study area. New Hanover County contacts indicated that homes in the Stephens Church Road area may be predominantly minority occupied residences.

In addition, data were collected from the 2010 US Census and the 2008 – 2012 American Community Survey (ACS) to determine if there were concentrations of minority or low-income populations within the study area. Prior to 2010, the US Census collected data on a decennial basis. This included 100-percent data on demographics such as population, race, and housing and sample data for other demographics such as income, poverty, and travel time to work. In 2010, the decennial census only collected the 100-percent data and the ACS now collects other demographic data (e.g. poverty, income, etc.) on an annual basis, which is then collected into 1-, 3-, and 5-year estimates. In addition, the ACS only collects data to the census tract level.

The data available at the 2010 census tract level were compared with the data previously collected at the 2000 block group level. The geographic areas of each level are roughly similar. However, the 2000 block group 9802.002 was split in 2010 into census tracts 9202.03 and 9202.04. Census tract 9202.03 includes a portion of the study area, while tract 9202.04 is outside the study area and not considered. The same criteria used above to define minority blocks and low-income block groups were applied at the tract level for comparison of more recent data.

A review of the ACS data on race (B02001 – Race) indicates that at the census tract level the minority population for all census tracts within the study area is below that of either county. ACS data were analyzed for the 2010 census tracts and did not reveal any census tracts meeting the criteria.

The relocation reports prepared for the project provide an estimate of minority relocations (see Appendix E). The reports also provide an estimate of the income level of households that would be displaced as a result of the proposed project. All of the detailed study alternatives will result in the relocation of minority-owned or occupied homes. Given the number of relocations and other environmental impacts along the entire project corridor, the project is not expected to have disproportionately high and adverse human health and environmental effects on low-income or minority populations.

In accordance with Title III of the Civil Right Act of 1964 and Executive Order 12898, it has been determined that the proposed project would not directly, or through contractual or other arrangements, use criteria, methods, or practices that discriminate on the basis of race, color, or national origin, nor would it have a disproportionate effect on minority or low-income communities.

Public outreach activities have extended to the entire study area, including minority and low-income persons. Five newsletters were mailed to property owners within the study area, and three citizens informational workshops were held – two in Pender County and one in New Hanover County. In addition, two corridor public hearings were held (one in Pender County and one in New Hanover County) for the entire project in October 2011 following distribution of the DEIS, and a design public meeting was held in New Hanover County for Military Cutoff Road Extension in August 2012. Citizens were given the opportunity to comment or ask questions via comment forms at the workshops and hearings, e-mail, and a toll-free project information line. Section 5.2 includes a detailed discussion of the public involvement activities to date for the proposed project.

#### **4.1.5 ECONOMIC EFFECTS**

It is anticipated any new and/or improved access and mobility provided by the proposed project will have a positive economic effect.

Complementary development such as highway-oriented uses is not expected to be associated with either Military Cutoff Road Extension alternative. It is anticipated development would follow current nearby uses and zoning, which is mostly residential.

A mix of higher density uses could occur along either alternative. Complementary development could be expected around the proposed Hampstead Bypass interchange at NC 210 for all alternatives. Rural residential uses may transition to higher density residential development in the vicinity of this interchange, as well.

New roadway infrastructure combined with water and sewer availability could encourage growth. However, the project will only provide new access in a few select areas, such as along the Military Cutoff Road Extension corridor and at the proposed NC 210 interchange.

The Wilmington area in general is likely to continue to be a regional draw for development. Since the area around Military Cutoff Road is already built upon or planned for development, it is not expected that Military Cutoff Road Extension would have any influence on intraregional land development location decisions. All of the Hampstead Bypass detailed study alternatives would make conditions more favorable for commuters coming to the Wilmington area from the north. More favorable commuting conditions combined with a desirable location near Wilmington could have some influence on intraregional land development location decisions.

Substantial travel time savings (more than ten minutes) are expected for travelers using the Hampstead Bypass because they will have a through route without the traffic signals and congestion characteristic of Market Street and existing US 17. Although not as substantial as the Hampstead Bypass, Military Cutoff Road Extension will also offer travel time savings as an alternative to Market Street and a connection to the Hampstead Bypass.

As noted in the SDEIS, with the addition of the interchange north of the Topsail Schools complex travel time savings are expected for travelers from the north wishing to access the Topsail schools or businesses along existing US 17 between Grandview Drive and Leeward Lane. Residents living in the area wishing to travel north on US 17 should also experience travel time savings with the additional interchange. The additional access north of the schools will result in slightly more traffic along the portion of existing US 17 between Grandview Drive and Leeward Lane, which should be positive to businesses along this section of existing US 17.

Property values may increase in areas where new access to developable land is provided. This could occur with the Military Cutoff Road Extension alternatives and the Hampstead Bypass alternatives near the proposed interchange at NC 210.

A decrease in value to some properties could be possible. Where the roadway alignment extends very close to residential areas, such as existing neighborhoods near Military Cutoff Road Extension or properties near the proposed Hampstead Bypass, properties could decrease in value because of potential loss in aesthetics, increase in noise, or partial taking of some properties.

## **4.2 LAND USE AND TRANSPORTATION PLANNING**

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### **4.2.1 LAND USE PLANS**

The proposed project is compatible with New Hanover County and Pender County land use plans.

Wilmington and New Hanover County are generally supportive of growth, with an emphasis on redeveloping degraded properties, protecting area resources, and ensuring that proper infrastructure is in place. The proposed Military Cutoff Road Extension is compatible with local public policy, since it will improve infrastructure and provide access to areas designated for residential growth.

Pender County is supportive of growth, but also exhibits caution to protect the county's resources and rural lifestyle. Plans adopted by officials show that in areas most likely to experience growth from the Hampstead Bypass, growth has already been anticipated and planned for.

The area between the Wilmington Bypass and the New Hanover County/Pender County line is shown as "Wetland Resource Protection Areas" in the *Wilmington-New Hanover County Joint Coastal Area Management Plan 2006 Update*. Since there would be no access to developable land in this area with the proposed Hampstead bypass, this project is not considered to be in conflict with the Plan.

#### **4.2.1.1 COASTAL AREA MANAGEMENT ACT**

The proposed project is compatible with the New Hanover County and Pender County land use plans and meets the consistency requirement of the Coastal Area Management Act (CAMA). As discussed in Section 3.5.4.6, there are no CAMA Areas of Environmental Concern (AEC) present within the study area. During the Section 404 Permit application process, NCDOT will request a Consistency Certification from NCDOT that the proposed project complies with the enforceable policies of the North Carolina Coastal Management Program.

### **4.2.2 TRANSPORTATION PLANS**

#### **4.2.2.1 COMPATIBILITY WITH HIGHWAY PLANS**

Military Cutoff Road Extension (U-4751) and Hampstead Bypass (R-3300) are compatible with New Hanover County and Pender County transportation plans.

Project U-4751 is included in the approved *2012-2018 NCDOT State Transportation Improvement Program* (STIP) as an extension of Military Cutoff Road on new location from its current terminus at US 17 Business (Market Street) in Wilmington north to the US 17 Wilmington Bypass (John Jay Burney Jr. Freeway). Project R-3300 is included in the approved 2012-2018 STIP as a US 17 bypass of Hampstead. Both projects are programmed in the draft 2013-2023 NCDOT Program and Resource Plan.

The scope of the Hampstead Bypass is consistent with the North Carolina Strategic Highway Corridor vision for the US 17 corridor as a freeway.

#### **4.2.2.2 COMPATIBILITY WITH TRANSIT PLANS**

The proposed project does not conflict with New Hanover County transit plans. Pender County does not currently have public transit operations in place. The proposed project does not conflict with Pender Adult Services, Inc. transit system operations. The proposed projects could benefit intercity bus service by reducing delay for bus routes operating on Market Street. The study area is not currently served by passenger rail service.

#### **4.2.2.3 COMPATIBILITY WITH BICYCLE/PEDESTRIAN PLANS**

The proposed project does not conflict with local or regional bicycle or pedestrian plans.

All of the Hampstead Bypass alternatives will cross NC Bike Route 3 at NC 210. From NC 210, NC Bike Route 3 ties into existing US 17 and continues north through Pender County. Hampstead Bypass alternatives will tie into a section of existing US 17 near Leeward Lane that includes NC Bike Route 3. NCDOT will re-route NC Bike Route 3 to avoid the portion of existing US 17 that will have full control of access (between Leeward Lane and Long Leaf Drive) once the Hampstead Bypass is completed. Bicycle safe bridge railing will be provided on the NC 210 bridge over the Hampstead Bypass.

The existing multi-use path along Military Cutoff Road is included as part of the Soundside Route identified as Unsigned Bicycle Route 11 in the February 2008 WMPO BikePed Committee Bicycle Routes Map. This route connects the Middle Sound Area (near Ogden) to Carolina Beach Road.

Fourteen-foot outside lanes are proposed on Military Cutoff Road Extension from Market Street to approximately one mile north of Torchwood Boulevard to accommodate bicycles.

The Wilmington Metropolitan Planning Organization (MPO) has requested the inclusion of a multi-use path along proposed Military Cutoff Road Extension (see Appendix B). The multi-use path would tie into the existing multi-use path along Military Cutoff Road. The construction of a multi-use path as part of the proposed project will be dependent upon a cost-sharing and maintenance agreement between NCDOT and the Wilmington MPO. NCDOT will continue to coordinate with the Wilmington MPO on the inclusion of the multi-use path along Military Cutoff Road Extension.

All of the Hampstead Bypass alternatives would construct a fully-controlled access facility. No bicycle or pedestrian accommodations are proposed on Hampstead Bypass, as bicycles and pedestrians are prohibited from using freeways. Any proposed bridges carrying local roads over the proposed bypass will be constructed with an offset between the edge of the travel lane and the bridge rail to provide a walking area across the bridge.

## 4.3 IMPACTS TO THE PHYSICAL ENVIRONMENT

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### 4.3.1 NOISE IMPACTS

In accordance with Title 23 Code of Federal Regulations Part 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772) and the NCDOT Traffic Noise Abatement Policy (July 2011), each Type I highway project must be analyzed for predicted traffic noise impacts. In general, Type I projects are proposed State or Federal highway projects for construction of a highway or interchange on new location, improvements of an existing highway which substantially changes the horizontal or vertical alignment or increases the vehicle capacity, or projects that involve new construction or substantial alteration of transportation facilities such as weigh stations, rest stops, ride-share lots, or toll plazas.

The traffic noise analysis presented in the DEIS was completed prior to approval of the current (July 2011) NCDOT Traffic Noise Abatement Policy. The results of the earlier traffic noise analysis have been revised in accordance with the July 2011 noise abatement policy.

Traffic noise impacts are determined through implementing the current Traffic Noise Model (TNM) approved by the Federal Highway Administration (FHWA) and following procedures detailed in 23 CFR 772, the NCDOT Traffic Noise Abatement Policy, and the NCDOT Traffic Noise Analysis and Abatement Manual. When traffic noise impacts are predicted, examination and evaluation of alternative noise abatement measures must be considered for reducing or eliminating these impacts. Temporary and localized noise impacts will likely occur as a result of project construction activities. Construction noise control measures will be incorporated into the project plans and specifications.

A copy of the unabridged version of the full technical report, titled *Traffic Noise Technical Memorandum - US 17 Corridor Study*, NCDOT TIP Nos. U-4751 and R-3300, can be viewed in the Project Development & Environmental Analysis Unit, Century Center Building A, 1000 Birch Ridge Drive, Raleigh.

The NCDOT Traffic Noise Abatement Policy requires a traffic noise analysis be completed for each project alternative for each of the activity categories listed in Table 4-2.

Table 4-2. Noise Abatement Criteria

<b>Noise Abatement Criteria (NAC)</b> <b>Hourly Equivalent A-Weighted Sound Level (decibels (dB(A)))</b>			
<b>Activity Category</b>	<b>Activity Criteria<sup>1</sup> L<sub>eq(h)</sub><sup>2</sup></b>	<b>Evaluation Location</b>	<b>Activity Description</b>
A	57	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B <sup>3</sup>	67	Exterior	Residential
C <sup>3</sup>	67	Exterior	Active sport areas, amphitheaters, auditoriums, campgrounds, cemeteries, daycare centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreation areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E <sup>3</sup>	72	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	--	--	Agriculture, airports, bus yards, emergency services, industrial, logging maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	--	--	Undeveloped lands that are not permitted.

<sup>1</sup>The L<sub>eq(h)</sub> Activity Criteria values are for impact determination only, and are not design standards for noise abatement measures.

<sup>2</sup>The equivalent steady-state sound level which, in a stated period of time, contains the same acoustic energy as the time-varying sound level during the same time period, with L<sub>eq(h)</sub> being the hourly value of L<sub>eq</sub>.

<sup>3</sup>Includes undeveloped lands permitted for this activity category.

#### 4.3.1.1 TRAFFIC NOISE IMPACTS AND NOISE CONTOURS

The maximum number of receptors in each project alternative predicted to become impacted by future traffic noise is shown in Table 4-3. The table includes those receptors expected to experience traffic noise impacts by either approaching or exceeding the FHWA NAC or by a substantial increase in exterior noise levels.

The maximum extent of the 71 and 66 dB(A) noise level contours measured from the center of the proposed roadway is 152 feet and 260 feet, respectively.

Table 4-3. Predicted Traffic Noise Impacts by Alternative<sup>1</sup>

Traffic Noise Impacts <sup>2</sup>	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
Residential (NAC B)	186	167	174	207	204
Commercial (NAC E)	42	42	42	75	75
Churches, Schools, and Parks (NAC C and D)	4	4	4	10	10
<b>TOTAL</b>	232	213	220	292	289

<sup>1</sup>Per TNM 2.5 and in accordance with 23 CFR 772.

<sup>2</sup>The NCDOT Traffic Noise Abatement Policy has changed since completion of the DEIS. The traffic noise impacts for the DEIS detailed study alternatives and NCDOT's preferred alternative have been updated since the DEIS in accordance with the current (July 2011) NCDOT Traffic Noise Abatement Policy.

#### 4.3.1.2 TRAFFIC NOISE ABATEMENT MEASURES

Measures for reducing or eliminating the traffic noise impacts were considered for all impacted receptors in each alternative. The primary noise abatement measures evaluated for highway projects include highway alignment changes, traffic system management measures, establishment of buffer zones, noise barriers, and noise insulation (NAC D only). For each of these measures, benefits versus costs (reasonableness), engineering feasibility, effectiveness, and practicability and other factors were included in the noise abatement considerations.

Substantially changing the highway alignment to minimize noise impacts is not considered to be a viable option for this project due to engineering and/or environmental factors. Traffic system management measures are not considered viable for noise abatement due to the negative impact they would have on the capacity and level of service of the proposed roadway. Costs to acquire buffer zones for impacted



receptors will exceed the NCDOT base dollar value of \$37,500 plus an incremental increase of \$525 (as defined in the NCDOT Policy) per benefited receptor, causing this abatement measure to be unreasonable.

#### 4.3.1.2.1 NOISE BARRIERS

Noise barriers include two basic types: earthen berms and noise walls. These structures act to diffract, absorb, and reflect highway traffic noise. For this project, earthen berms were not found to be a viable abatement measure because the additional right-of-way, materials and construction costs are estimated to exceed the NCDOT maximum allowable base quantity of 7,000 cubic yards, plus an incremental increase of 100 cubic yards per benefited receptor, as defined in the NCDOT Policy.

A noise barrier evaluation was conducted for this project utilizing the Traffic Noise Model (TNM 2.5) software developed by FHWA. Table 4-4 summarizes the results of the evaluation, the noise wall parameters (i.e., length, average height, location, etc.). Based upon criteria defined in the NCDOT Traffic Noise Abatement Policy, these barriers are preliminarily justified and recommended for construction, contingent upon completion of the project design and the public involvement process.

Table 4-4. Preliminary Noise Barrier Evaluation Results<sup>1</sup>

Alternative (Noise Barrier Location)	Length/ Height (feet)	Square Footage	Number of Benefited Receptors	Square Feet per Benefited Receptor/ Allowable Square Feet per Benefited Receptor	Preliminarily Recommended for Construction <sup>2</sup>
Alternative U (Noise Study Area B – Noise Barrier B3 located along existing US 17 southbound approaching the US 17 Wilmington Bypass interchange with Market Street) (see Figure 10E)	4,094/17	69,598	36	1,934/2,640	Yes
Alternatives E-H, O, R, and U (Noise Study Area F – Noise Barrier F located along existing US 17 northbound from south of Leeward Lane to north of Long Leaf Drive) (see Figures 10I, 10K, and 16G)	3,750/18	67,500	77	877/2,640	Yes

Table 4-4. Preliminary Noise Barrier Evaluation Results *continued*

Alternative (Noise Barrier Location)	Length/ Height (feet)	Square Footage	Number of Benefited Receptors	Square Feet per Benefited Receptor/ Allowable Square Feet per Benefited Receptor	Preliminarily Recommended for Construction <sup>2</sup>
Alternatives M1&M2 (Noise Study Area J – Noise Barrier J1 located along Military Cutoff Road Extension northbound between Putnam Drive and north of Whittle Court) (see Figures 10C and 16B)	892/17	15,164	10	1,516/3,620	Yes
Alternatives M1&M2 (Noise Study Area J –Noise Barrier J2 located along Military Cutoff Road Extension southbound between Bradfield Court and Brittany Lakes Drive) (see Figures 10C and 16B)	1,879/19	35,701	42	850/3,620	Yes
Alternatives M1&M2 (Noise Study Area J –Noise Barrier J3 located along Military Cutoff Road Extension southbound north of Brittany Lakes Drive) (see Figures 10C and 16B)	757/19	14,383	6	2,397/3,620	Yes
Alternatives M1&M2 (Noise Study Area J – Noise Barrier J4 located along Military Cutoff Road Extension southbound north of Torchwood Boulevard) (see Figures 10C and 16B)	1,239/18	22,302	7	2,322/3,620	Yes

<sup>1</sup>The NCDOT Traffic Noise Abatement Policy has changed since completion of the DEIS. The results of the preliminary noise barrier evaluation have been updated since the DEIS in accordance with the current (July 2011) NCDOT Traffic Noise Abatement Policy.

<sup>2</sup>The recommendation for barrier construction is preliminary and subject to change, pending completion of final design and the public involvement process.

#### 4.3.1.3 TRAFFIC NOISE SUMMARY

A preliminary noise evaluation was performed for this project and a more detailed review will be completed during project final design. Noise barriers found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis due to changes in proposed project alignment and other design considerations, surrounding land use development, or utility conflicts, among other factors. Conversely, noise barriers that were not considered feasible and reasonable may meet the established criteria and be recommended for

construction. This evaluation completes the highway traffic noise requirements of 23 CFR 772.

In accordance with NCDOT Traffic Noise Abatement Policy, the Federal/State governments are not responsible for providing noise abatement measures for new development for which building permits are issued after the Date of Public Knowledge. The Date of Public Knowledge of the proposed highway project will be the approval date of the State Record of Decision (SROD). For development occurring after this date, local governing bodies are responsible to insure that noise compatible designs are utilized along the proposed facility.

#### **4.3.2 AIR QUALITY**

The Federal Clean Air Act of 1970 established the National Ambient Air Quality Standards (NAAQS). These standards were established to protect the public from known or anticipated effects of air pollutants. The most recent amendments to the NAAQS contain criteria for sulfur dioxide (SO<sub>2</sub>), particulate matter (PM), carbon monoxide (CO), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), and lead (Pb).

The primary pollutants from motor vehicles are unburned hydrocarbons, nitrous oxides, carbon monoxide, and particulates. Hydrocarbons and nitrogen oxides can combine in a complex series of reactions catalyzed by sunlight to produce photochemical oxidants such as ozone and NO<sub>2</sub>. Because these reactions take place over a period of several hours, maximum concentrations of photochemical oxidants are often found far downwind of the precursor sources.

A project-level qualitative air quality analysis was prepared for this project. A copy of the unabridged version of the full technical report titled *Air Quality Analysis* (July 2009) can be viewed at the Project Development & Environmental Analysis Unit, Century Center Building A, 1000 Birch Ridge Drive, Raleigh. On December 6, 2012, FHWA issued an update to the Mobile Source Air Toxics (MSAT) interim guidance of September 30, 2009 that advised FHWA Division offices on when and how to analyze MSAT under the National Environmental Policy Act (NEPA) review process for highway projects.

##### **4.3.2.1 MOBILE SOURCE AIR TOXICS (MSAT)**

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the US Environmental Protection Agency (USEPA) regulate 188 air toxics, also known as hazardous air pollutants. USEPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007). USEPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) ([www.epa.gov/ttn/atw/nata1999/](http://www.epa.gov/ttn/atw/nata1999/)). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde,

naphthalene, and polycyclic organic matter. The 2007 USEPA rule requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

An FHWA analysis using USEPA's Motor Vehicle Emissions Simulator (MOVES2010b) model (see Table 4-5) found even if vehicle-miles travelled (VMT) increases by 102 percent as assumed from 2010 to 2050, a combined reduction of 83 percent in the total annual emissions for the priority MSAT is projected for the same time period.

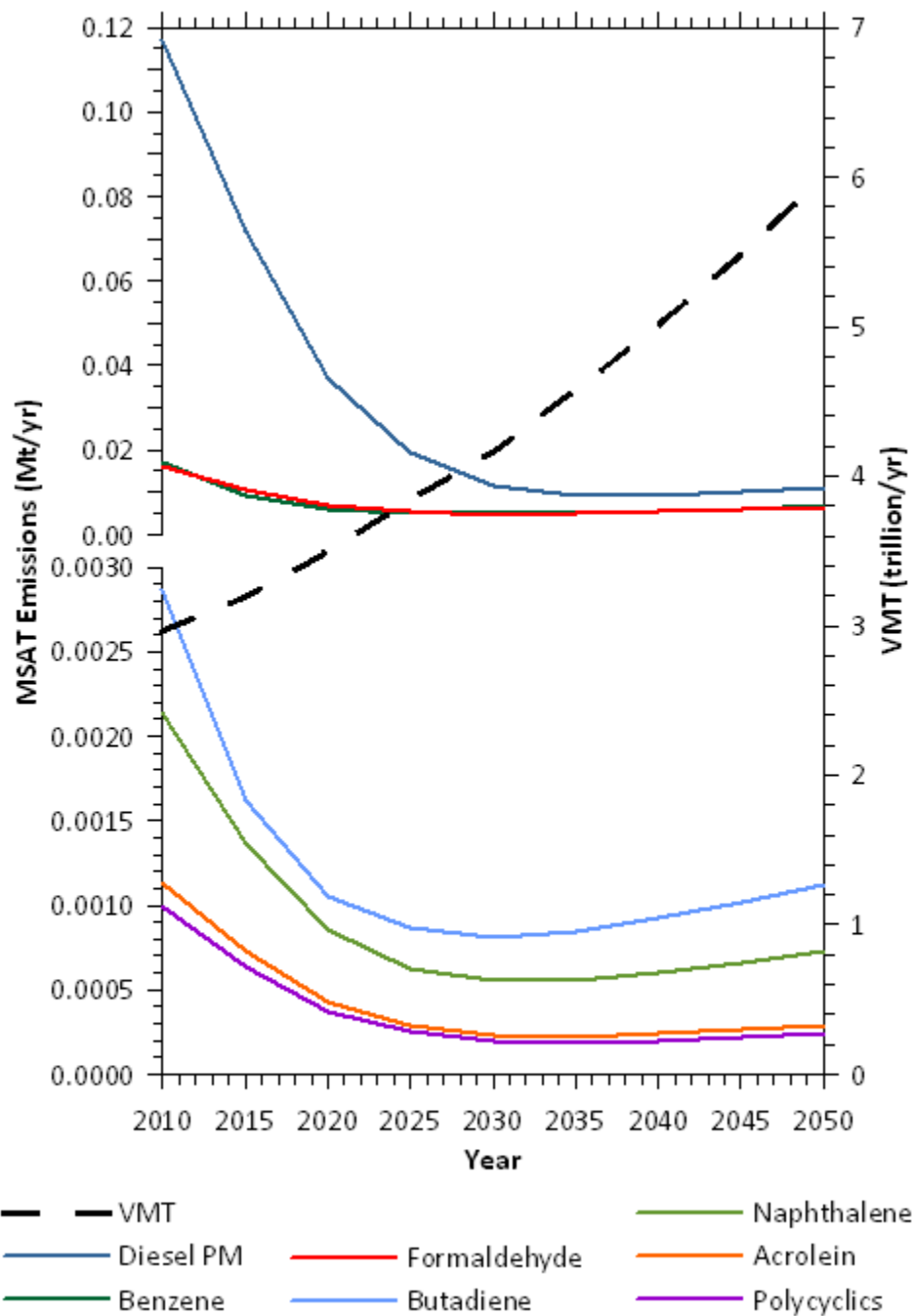
Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. These limitations impede the ability to evaluate how potential public health risks posed by MSAT exposure should be factored into project-level decision-making within the NEPA.

A qualitative MSAT analysis has been performed for this project. This analysis provides a basis for identifying and comparing the potential differences in MSAT emissions among project alternatives. The qualitative assessment presented below is derived in part from a study conducted by FHWA titled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives*, found at: [www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm](http://www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm).

Regardless of the alternative chosen, emissions will likely be lower than present levels in the design year as a result of USEPA's national control programs that are projected to reduce annual MSAT emissions by over 80 percent from 2010 to 2050. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. However, the magnitude of the USEPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

The travel lanes contemplated as part of the proposed new location project (Military Cutoff Road Extension/US 17 Hampstead Bypass) will have the effect of moving some traffic closer to nearby homes, schools and businesses; therefore, there may be localized areas where ambient concentrations of MSAT could be higher under the Build Alternative than under the No-Build Alternative. The localized increases in MSAT concentrations would likely be most pronounced along the new alignment segments and along the sides of existing roadway(s) where asymmetrical widening occurs. However, the magnitude and the duration of these potential increases, compared to the No-Build Alternative, cannot be reliably quantified due to incomplete or unavailable information in forecasting project-specific MSAT health impacts. In sum, when a highway is widened, the localized level of MSAT emissions for the Build Alternative could be higher relative to the No-Build Alternative, but this could be offset due to increases in speeds and reductions in congestion (which are associated with lower MSAT emissions). Also, MSAT will be lower in other locations when traffic shifts away from them. However, on a regional basis, USEPA's vehicle and fuel regulations, coupled with fleet turnover, will over time cause substantial reductions that, in almost all cases, will cause region-wide MSAT levels to be significantly lower than today.

Table 4-5. National MSAT Emission Trends 1999 – 2050 for Vehicles Operating on Roadways Using USEPA’s MOVES2010b Model



Note: Trends for specific locations may be different, depending on locally derived information representing vehicle-miles travelled, vehicle speeds, vehicle mix, fuels, emission control programs, meteorology, and other factors.

Source: USEPA MOVES2010b model runs conducted during May – June 2012 by FHWA.

With the Build Alternative in the design year it is expected there would be reduced MSAT emissions in the immediate area of the project due to USEPA's MSAT reduction programs.

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable.

It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by the Health Effects Institute (HEI) (<http://pubs.healtheffects.org/view.php?id=282>). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. USEPA ([www.epa.gov/risk/basicinformation.htm#g](http://www.epa.gov/risk/basicinformation.htm#g)) and HEI (<http://pubs.healtheffects.org/getfile.php?u=395>) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current process used by the USEPA as provided by the Clean Air Act to determine whether more stringent controls are required to protect public health or to prevent an adverse environmental effect for industrial sources is a two-step process. The first step requires USEPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in

maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the US Court of Appeals for the District of Columbia Circuit upheld USEPA's approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities, plus improved access for emergency response, that are better suited for quantitative analysis.

#### **4.3.2.2 SUMMARY**

Vehicles are a major contributor to decreased air quality because they emit a variety of pollutants into the air. Changing traffic patterns are a primary concern when determining the impact of a new highway facility or the improvement of an existing highway facility. New highways or the widening of existing highways increase localized levels of vehicle emissions, but these increases could be offset due to increases in speeds from reductions in congestion and because vehicle emissions will decrease in areas where traffic shifts to the new roadway. Significant progress has been made in reducing criteria pollutant emissions from motor vehicles and improving air quality, even as vehicle travel has increased rapidly.

The project is located in New Hanover and Pender Counties, which comply with the National Ambient Air Quality Standards. This evaluation completes the assessment requirements for air quality of the 1990 Clean Air Act Amendments and the NEPA process, and no additional reports are necessary.

#### **4.3.3 FARMLAND IMPACTS**

All of the detailed study alternatives will impact prime farmland. Table 4-6 shows the anticipated prime and unique farmland soils impacts. The impacts are based on the completed Farmland Conversion Impact Rating for Corridor Type Projects (CPA-106) forms from the NRCS (see Appendix B). Using the current Farmland Protection Policy Act Manual (August 2012), lands not covered by the act include urbanized areas. This project does not include other areas that may be eliminated from coverage, such as areas for national defense or water storage. The use of urbanized areas as designated by the US Census represents a change from the policy in place at the time of the DEIS (July 2011). The policy prior to August 2012 also removed from consideration those areas designated by state, county or local government for urban uses (e.g., residential, commercial or industrial zoning) or included in adopted land use plans for future urban development.

The preferred alternative has approximately 160 acres that are exempt from land evaluation by NRCS within the Wilmington Urbanized Area. With the previous method of determining exempt land utilized for the DEIS, all of the project area within New Hanover County was exempt from evaluation by NRCS. The preferred alternative has approximately 61 acres in the Hampstead Urbanized Area in Pender County. Using the previous method, approximately 193 acres were exempt in 2011. Although the corridor for Alternative M1+E-H evaluated in the DEIS is generally the same as the corridor evaluated for the preferred alternative, these changes result in a substantial increase in reported farmland impacts. A similar increase would be expected for all of the DEIS detailed study alternatives.

As shown on Figure 22, the proposed interchange at existing US 17 where DEIS detailed study alternatives M1+U and M2+U would go on new location would be in a relatively large portion of southwestern Pender County that is zoned as “Agriculture.” Although all of the corridors for the DEIS detailed study alternatives and the preferred alternative cross this portion of Pender County, this is the only interchange proposed within this area.

Table 4-6. Prime and Unique Farmland Soils Impacts

	Alternative				
	M1+E-H (Preferred Alternative) <sup>1</sup>	M2+O	M1+R	M1+U	M2+U
<b>Prime and Unique Farmland Soils Impacts (acres)</b>	501	58	58	50	50

<sup>1</sup>NRCS changed their method for calculating impacts to prime and unique farmland soils since completion of the DEIS and LEDPA selection. NRCS’ new methodology for calculating farmland impacts is described in the Farmland Protection Policy Act Manual (440-V-CPM – Amendment 12, Subpart B, Section 523.10, Lands Covered by the Act, August 2012). The prime and unique farmland impacts shown in Table 4-6 for Alternative M1+E-H (Preferred) were calculated using the new methodology during preparation of this FEIS. The prime and unique farmland impacts shown in Table 4-6 for the other DEIS detailed study alternatives were calculated using the old methodology and presented at the May 2012 LEDPA meeting and in the DEIS. A similar increase would be expected for all of the DEIS detailed study alternatives using the new methodology.

Information was obtained from New Hanover and Pender Counties regarding parcels designated as “farmland” (agriculture, forestry and/or horticulture). The DEIS detailed study alternatives would have the following impacts to farmland parcels: M1+E-H (preferred alternative) – 287 acres, M1+R – 314 acres, M1+U – 298 acres, M2+O – 232 acres, and M2+U – 274 acres.



The updated relocation report for NCDOT's preferred alternative (see Appendix E) includes a blueberry farm north of the Topsail Schools complex among the relocated businesses. This farm would be similarly impacted by all of the DEIS detailed study alternatives.

#### **4.3.4 UTILITY IMPACTS**

All of the detailed study alternatives will impact both private and public utilities. Impacts will include the relocation, adjustment or modification of gas, water, electric, sewer, telephone, and fiber optic cable lines. The relocation of power poles also will be required as a result of the proposed project.

The DEIS noted Hampstead Bypass Alternatives would isolate water tanks for Belvedere Plantation subdivision and cut-off access to a cell tower. Access to the Belvedere Plantation well site will be maintained. SR14 will provide access to the cell tower.

Military Cutoff Road Extension Alternatives M1 and M2 extend across the southwestern corner of the Cape Fear Public Utility Authority (CFPUA) well field and groundwater nanofiltration water treatment plant property. As discussed in Section 4.5.3.1.1, the Military Cutoff Road Extension design was modified since completion of the DEIS to maintain a minimum distance of 100 feet between proposed right-of-way and CFPUA wellheads. Neither alternative is expected to impact structures associated with on-site water treatment or storage. Both Alternatives M1 and M2 would cross existing and proposed water lines. Any impacted water lines would be relocated as part of the proposed project and returned to service. Alternative M2 would impact more existing and proposed water lines than Alternative M1. Table 4-7 shows the anticipated utility relocation and construction costs associated with each detailed study alternative. The cost estimate for NCDOT's preferred alternative is based on the current preliminary design.

All of the DEIS detailed study alternatives would require the removal of the wastewater treatment package plant that serves the Topsail Schools. NCDOT has coordinated with the Pender County School System regarding this impact. The school system has no objections to the removal of their plant and connecting the schools to a sewer system operated by another party. NCDOT will connect the schools to sewer lines which are proposed to run along existing US 17 to serve other developments in the area of the schools prior to the removal of the package plant.

Executive Orders 13212 and 13302 require federal agencies to take actions to expedite projects which will increase the production, transmission, or conservation of energy, or which strengthen pipeline safety. The subject project is not energy-related, therefore Executive Orders 13212 and 13302 do not apply.

Table 4-7. Utility Relocation and Construction Costs

	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
<b>Utility Relocation and Construction Costs</b>	\$1,368,734	\$2,068,520	\$1,886,700	\$2,502,300	\$2,684,120

#### 4.3.5 HAZARDOUS MATERIALS IMPACTS

Section 4.3.5 of the DEIS notes five potential hazardous material sites could be impacted by the detailed study alternatives. As a result of design changes prior to the selection of the preferred alternative, Kelly's Automotive would no longer be potentially impacted.

Proposed changes to the project as documented in the Supplemental DEIS may impact an additional property (Jebby's on 17) with a possible underground storage tank (UST). The property is located along US 17 in the vicinity of the proposed US 17 Hampstead Bypass interchange south of Grandview Drive (see Figure 10I and Figure 16F). The proposed third southbound lane on the US 17 Hampstead Bypass carries traffic exiting from the bypass to existing US 17 in this area.

Military Cutoff Road Extension Alternatives M1 and M2 may impact four properties that either have or formerly had underground storage tanks (USTs). The properties are located along Market Street in the vicinity of the proposed interchange with Military Cutoff Road Extension (see Figure 10C and Figure 16B). Proposed Lendire Road improvements may impact an additional site with USTs (Scotchman #35). As discussed in Section 3.3.5 of this document, the level of geo-environmental impact potential refers to the potential for future environmental liability if the property is acquired, as well as the anticipated risk of a substantial increase in project costs and/or scheduling associated with affecting the site. Sites with low geo-environmental impact potential are anticipated to have little to no impacts with respect to these issues. All 35 sites in the project study area (listed in Table 3-5) are anticipated to have low geo-environmental impact potential on the proposed project. The discovery of additional sites not recorded by regulatory agencies and not reasonably discernible during the field reconnaissance could occur later in project development.

The six potential hazardous materials sites that may be impacted by the proposed project are:

- Jebby's on 17, 15831 US 17, Hampstead – This facility is operated as a restaurant and bar. Property layout and signage suggest it may have been a gas station at one time.

This property does not appear in the UST Section registry and no monitoring wells or other UST evidence was noted. The site is anticipated to present low geo-environmental impacts to the project.

- Walgreens Drug Store, 6861 Market Street, Wilmington – This business (formerly Snak Mart, Inc.) presently operates as a drug store. Five USTs were closed at this site in 2001. There are no USTs currently in use. The site is anticipated to present low geo-environmental impacts to the project.
- O’Leary’s Auto Repair, 6905 Market Street, Wilmington – This facility currently operates as an automotive repair shop. There are no USTs currently in use at this facility. The site is anticipated to present low geo-environmental impacts to the project.
- Pro Lube, 6940 Market Street, Wilmington – This business presently operates as an oil change facility. There are no USTs currently in use at this site. The site is anticipated to present low geo-environmental impacts to the project.
- Market Street Citgo, 6980 Market Street, Wilmington – This facility currently operates as a convenience store and gas station. The UST registry shows six tanks currently in use at this facility. This site was investigated as part of NCDOT STIP Project U-4902. The site is anticipated to present low geo-environmental impacts to the project.
- Scotchman #35, 7158 Market Street, Wilmington – This facility currently operates as a convenience store and gas station. The UST registry shows two tanks currently in use at this facility and four USTs were removed in 1997. The site is anticipated to present low geo-environmental impacts to the project.

Prior to right-of-way acquisition, preliminary site assessments, including soil and groundwater assessments, to identify the nature and extent of any contamination will be performed on each of the properties identified that would be impacted. The results will be used to determine any need for remediation of contaminants in the soil or groundwater and that need would be taken into consideration during right-of-way acquisition. The discovery of additional sites not recorded by regulatory agencies and not reasonably discernible during the field reconnaissance could occur. If additional sites are discovered that would be impacted by the proposed project, soil and groundwater assessments would be conducted on those sites as well.

#### **4.3.6 MINERAL RESOURCES**

Whitehouse Creek Mine off of US 17 in Pender County (see Figure 10G) is located adjacent to Alternative U. HanPen Mine off of Sidbury Road in Pender County (see Figure 10F and Figure 16D) is located adjacent to Alternative E-H. The current extent of sand and gravel mining activities at these sites will not be impacted by the project. Alternative E-H may impact possible future expansions to HanPen Mine.

#### 4.3.7 FLOODPLAIN/FLOODWAY IMPACTS

All of the detailed study alternatives cross floodplains (see Figures 10A through 10K and Figures 16A through 16G). Hampstead Bypass alternatives E-H, O, and R include major hydraulic crossings in a Federal Emergency Management Agency (FEMA) detailed study Special Flood Hazard Zone. Hydraulic design for these crossings will not create constraints to flow. Therefore, upstream floodways will not be affected by placement of these structures.

Table 4-8 shows the anticipated impacts of the revised preliminary design for the preferred alternative on floodplains. The revised preliminary design includes the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date. Table 4-8 also provides a comparison to the floodplain impacts of the DEIS detailed study alternatives. The floodplain impacts in Table 4-8 reflect updated floodplain mapping from the North Carolina Flood Maps Data Service which became available since the release of the July 2011 DEIS. No new major hydraulic crossings are proposed with the revised preliminary design for any of the alternatives.

In accordance with Executive Order 11988, the Hydraulics Unit will coordinate with the NC Floodplain Mapping Program (FMP), the delegated state agency for administering FEMA's National Flood Insurance Program, to determine the status of the project with regard to applicability of NCDOT's Memorandum of Agreement with FMP (dated April 22, 2013), or approval of a Conditional Letter of Map Revision (CLOMR) and subsequent final Letter of Map Revision (LOMR).

This project involves construction activities on or adjacent to FEMA-regulated streams. Therefore, NCDOT Division 3 shall submit sealed as-built construction plans to the Hydraulics Unit upon completion of project construction, certifying that the drainage structure(s) and roadway embankment located within the 100-year floodplain were built as shown in the construction plans, both horizontally and vertically.

Table 4-8. Floodplain/Floodway Impacts

	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
<b>100-Year Floodplain and Floodway Impacts (acres)</b>	33.08	25.48	25.48	22.20	22.20

#### **4.3.8 PROTECTED LANDS IMPACTS**

##### **4.3.8.1 WILD AND SCENIC RIVERS**

As noted in Section 3.3.8.1, no Wild and Scenic Rivers are located within the study area.

##### **4.3.8.2 STATE/NATIONAL FORESTS**

As noted in Section 3.3.8.2, no state or national forests are located within the study area.

##### **4.3.8.3 GAME LANDS AND PRESERVATION AREAS**

Table 4-9 shows the anticipated impacts of the DEIS detailed study alternatives and the preferred alternative on SNHAs and other managed preservation areas within the study area. All of the DEIS detailed study alternatives and the preferred alternative would impact NCDOT mitigation sites. DEIS Detailed Study Alternatives M2+O and M1+R also would impact the Blake Savanna SNHA. Additional information regarding these sites is included in Section 3.3.8.3 and the sites are shown on Figures 10A through 10K and Figures 16A through 16G.

Table 4-9. Gamelands and Preservation Area Impacts

Natural Heritage Program SNHA, Managed Areas, and Wetland Mitigation Sites (acres)	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
Holly Shelter Game Land	0.00	0.00	0.00	0.00	0.00
Corbett Tract Mitigation Site	0.58	0.00	0.58	0.08	0.00
Corbett Tract Residual Strip	3.48	0.27	3.55	2.85	0.00
Plantation Road Mitigation Site	0.27	13.28	0.30	0.31	22.03
34-Acre Residual Site	0.00	28.81	0.00	0.00	12.37
22-Acre Residual Site	0.00	0.00	0.00	0.00	0.00
Blake Savanna	0.00	0.58	0.58	0.00	0.00
<b>TOTAL</b>	4.33	42.94	5.01	3.24	34.40

#### **4.4 CULTURAL RESOURCES IMPACTS**

##### **4.4.1 HISTORIC ARCHITECTURAL RESOURCES**

As described in Section 3.4.1, there is one property within the Area of Potential Effects (APE) listed on the National Register of Historic Places and four properties eligible for

listing. Prior to completion of the July 2011 DEIS, the potential effect of the DEIS detailed study alternatives on historic architectural resources was evaluated in accordance with Section 106 of the National Historic Preservation Act. The State Historic Preservation Office (HPO) concurred with the effect determinations at a meeting held on March 8, 2011, and these determinations were summarized in Table 4-8 of the DEIS. A copy of HPO's March 2011 concurrence form is included in Appendix B.

NCDOT completed a historic architecture reconnaissance survey of the extended study area for the Lendire Road improvements in October 2013. The survey did not identify any National Register-listed or Study Listed properties within the Lendire Road improvements APE, but eleven properties over fifty years of age were identified. At a meeting on October 29, 2013, HPO concurred none of the eleven properties are eligible for listing in the National Register of Historic Places and no further evaluation of these properties is necessary. A copy of HPO's concurrence form for the Lendire Road area is included in Appendix B.

Prior to the May 2012 Concurrence Point 3 merger team meeting, avoidance and minimization measures were incorporated into the designs of Military Cutoff Road Extension Alternatives M1 and M2 at Mount Ararat AME Church. A southbound free flow ramp onto Military Cutoff Road Extension was changed from a full exit lane to an angular exit. In addition, the storage length for the right turn lane from Market Street onto Ogden Park Drive was reduced to match existing conditions. Avoidance and minimization measures also were incorporated into the design of US 17 Hampstead Bypass Alternative U at Poplar Grove, Wesleyan Chapel United Methodist Church, and Scotts Hill Rosenwald School. HPO reviewed the avoidance and minimization measures on May 13, 2014 and revised the March 2011 effects determination at Scotts Hill Rosenwald School from Adverse Effect (as reported in the DEIS) to No Adverse Effect. This is the only effects determination that has been revised since the DEIS. A copy of HPO's concurrence form showing the May 2014 revised effects determination for Scotts Hill Rosenwald School is also included in Appendix B. The additional revisions described in this FEIS to the designs of the DEIS detailed study alternatives and the preferred alternative did not lead to any additional revisions to the DEIS historic architectural resources effects determinations. The effects determinations for the revised preliminary designs for the DEIS detailed study alternatives and the preferred alternative are summarized by alternative in Table 4-10.

Table 4-10. Historic Architectural Resource Effects

Historic Property	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
Poplar Grove	No Effect	No Effect	No Effect	Adverse Effect	Adverse Effect
Mount Ararat AME Church	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect	Adverse Effect
Wesleyan Chapel United Methodist Church	No Effect	No Effect	No Effect	Adverse Effect	Adverse Effect
Scotts Hill Rosenwald School	No Effect	No Effect	No Effect	No Adverse Effect	No Adverse Effect
Topsail Consolidated School	No Effect	No Effect	No Effect	No Effect	No Effect

The Concurrence Point 4A (CP 4A) merger team meeting to discuss avoidance and minimization for the proposed Military Cutoff Road Extension was held on June 14, 2012. The merger team concurred on avoidance and minimization measures for Military Cutoff Road Extension on September 25, 2012. A copy of the signed September 2012 Avoidance and Minimization concurrence form for the Military Cutoff Road Extension is included in Appendix C. As previously agreed to by HPO, the September 2012 CP 4A agreement for Military Cutoff Road Extension included the following commitment related to avoidance and minimization of impacts to Mount Ararat AME Church:

“Avoidance and minimization measures have been incorporated into the Alternative M1 design on Market Street at Mount Ararat AME Church. A southbound free flow ramp onto Military Cutoff Road Extension was changed from a full exit lane to an angular exit. In addition, the storage length for the right turn lane from Market Street onto Ogden Park Drive was reduced to match existing conditions. Right of way impacts to the proposed Mount Ararat AME Church historical boundary were reduced from 0.58 acre to 0.05 acre.”

As discussed in Section 2.8.6, as part of the proposed Lendire Road improvements it is now recommended to carry a third southbound lane on Market Street from the re-aligned Lendire Road-Middle Sound Loop Road intersection to the proposed Military Cutoff Road Extension interchange. This third lane results in impacts within the portion of the Mount Ararat historic boundary north of Ogden Park Drive similar to the impacts of the original preliminary design prior to the September 2012 CP 4A commitment discussed above. Impacts within the historic boundary south of Ogden Park Drive will remain similar to the minimized design. A merger informational meeting was held on January 22, 2014 to discuss proposed service road locations for US 17 Hampstead Bypass and Military Cutoff Road Extension. Information regarding proposed intersection improvements in the vicinity of Lendire Road and Market Street also was

reviewed. As a result of the revised preliminary design along Market Street adjacent to Mount Ararat AME Church caused by the proposed intersection improvements at Lendire Road, the merger team agreed to a revised CP 4A commitment related to avoidance and minimization measures at the church, as follows:

“Avoidance and minimization measures have been incorporated into the Alternative M1 design on Market Street at Mount Ararat AME Church. A southbound free flow ramp onto Military Cutoff Road Extension was changed from a full exit lane to an angular exit.”

The revised commitment for Mount Ararat AME Church was incorporated into the September 2012 CP 4A concurrence form for Military Cutoff Road Extension, along with service road avoidance and minimization measures, and the revised form was signed on April 23, 2014. A copy of the revised April 2014 CP 4A form for Military Cutoff Road Extension is also included in Appendix C.

USACE notified the Advisory Council on Historic Preservation (ACHP) of the adverse effect with the preferred alternative on the National Register-eligible Mount Ararat AME Church in a letter dated January 6, 2014 (see Appendix B). In their February 5, 2014 response (see Appendix B), ACHP concluded their further participation in the consultation to resolve the adverse effect is not required.

A Memorandum of Agreement (MOA) will be prepared between USACE, the State Historic Preservation Office (HPO), and NCDOT outlining mitigation measures for the adverse effect, and a copy of the MOA will be provided to ACHP in accordance with 36 CFR 800.6(b)(1)(iv) in order to complete the Section 106 requirements. In addition, as discussed in Section 5.2.2, NCDOT, USACE, and HPO held a meeting with the minister and members of Mount Ararat AME Church on May 3, 2014 to discuss the proposed project’s impacts on the church cemetery adjacent to Market Street.

#### **4.4.2 ARCHAEOLOGICAL RESOURCES**

As described in Section 3.4.2, there is one archaeological site (31PD344\*\*) within the Area of Potential Effects (APE) eligible for inclusion on the National Register of Historic Places. This site would be impacted by DEIS Detailed Study Alternatives M2+O and M1+R, as well as the preferred alternative. HPO’s October 15, 2013 memorandum concurring on the eligibility of this site for the National Register (see copy in Appendix B) also indicated that if this site cannot be avoided, further coordination would be required related to the development of a mitigation plan involving additional data recovery or avoidance. As a result, a Memorandum of Agreement will be prepared between USACE, HPO, and NCDOT outlining the mitigation measures for the preferred alternative’s adverse effect on this site.



#### **4.4.3 TRIBAL LANDS**

As noted in Section 3.4.3, there are no American Indian tribal lands within the project study area. In accordance with Executive Order 13175, it has been determined that the project will have no substantial direct effect on any Indian tribes.

### **4.5 IMPACTS TO THE NATURAL ENVIRONMENT**

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#### **4.5.1 SOILS/TOPOGRAPHICAL/GEOLOGICAL IMPACTS**

There are geotechnical engineering concerns associated with all of the detailed study alternatives due to the soft organic soils in the creek crossings and Carolina Bays. Soil improvement techniques may be necessary for the organic soils in order to control differential settlement. Side slopes of 3:1 or flatter are needed to establish vegetation and assist in erosion control. Additional subsurface drainage may be necessary to assist in drainage and/or consolidation of very wet or soft soils.

#### **4.5.2 BIOTIC COMMUNITY AND WILDLIFE IMPACTS**

##### **4.5.2.1 TERRESTRIAL COMMUNITIES AND WILDLIFE IMPACTS**

##### **4.5.2.1.1 TERRESTRIAL COMMUNITY IMPACTS**

Impacts to terrestrial communities resulting from land clearing are unavoidable. Project construction activities in or near terrestrial resources have the potential to impact the biological function of these resources. Table 4-11 shows the anticipated impacts of the revised preliminary design for the preferred alternative on terrestrial communities. The revised preliminary design includes the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date. Table 4-11 also provides a comparison to the terrestrial communities impacts of the DEIS detailed study alternatives as presented in the July 2011 DEIS.

Table 4-11. Terrestrial Community Impacts

Terrestrial Community Impacts (acres)	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
Maintained/Disturbed	352.00	270.16	310.78	497.25	459.36
Mesic Pine Flatwoods	254.61	93.65	171.60	175.68	150.91
Wet Pine Flatwoods	81.12	68.86	81.33	76.79	76.65
Pond Pine Woodland	84.90	222.71	83.63	59.62	133.68
Pocosin	75.09	60.27	62.34	21.66	21.66
Xeric Sandhill Scrub	56.15	49.87	47.83	18.00	18.00
Coastal Plain Bottomland Hardwood - Blackwater Subtype	30.21	40.90	43.31	9.18	9.18
Nonriverine Wet Hardwood Forest	2.03	0.06	0.06	49.72	49.72
Pine Savanna	14.51	16.72	16.72	0.00	0.00
Cutover	30.89	32.79	40.10	0.38	0.38
Coastal Plain Small Stream Swamp - Blackwater Subtype	18.46	3.67	12.89	0.00	0.00
Cypress/Gum Swamp - Blackwater Subtype	2.58	8.17	7.45	0.04	0.04
Nonriverine Swamp Forest	1.83	1.63	1.63	16.62	16.62
Small Depression Pocosin	0.24	0.00	0.00	0.00	0.00
Small Depression Pond	1.52	1.49	1.49	2.05	2.05
<b>TOTAL</b>	1,006.14	870.95	881.16	926.99	938.25

NCDOT Best Management Practices (BMPs) for the management of invasive plant species will be followed, which will comply with Executive Order 13112. NCDOT follows guidelines set forth in the Invasive Exotic Plants of North Carolina Manual (Smith, 2008) for BMPs. BMPs vary for each invasive species and largely depend on whether the species is a tree, shrub, herbaceous species, vine, or aquatic plant. Management will be primarily done with herbicides identified in the NC Agricultural Chemicals Manual, which lists treatments provided by North Carolina state law. When necessary, equipment sanitation requirements will be included to prevent soil with seeds and vegetative parts from spreading the invasive species. All state and federal rules for

transporting and disposing restricted, contaminated, or quarantined material are also included in the management protocol.

#### **4.5.2.1.2 TERRESTRIAL WILDLIFE IMPACTS**

Temporary fluctuation in populations of animal species which use terrestrial areas is anticipated during the course of construction. Slow-moving, burrowing, and subterranean organisms will be directly impacted by construction activities, while mobile organisms will be displaced to adjacent communities. Habitat reduction can occur when project construction affects undisturbed areas surrounding an existing man-dominated environment. When this occurs, competitive forces in the adapted communities will result in a redefinition of population equilibrium.

Hampstead Bypass Alternative U will impact less wildlife habitat than the other Hampstead Bypass alternatives because it has less construction on new location.

Fragmentation and loss of forested habitat may impact wildlife in the area by reducing potential nesting and foraging areas, as well as displacing animal populations. Forested areas provide connectivity between populations, allowing for gene flow, as well as a means of safe travel from one foraging area to another.

Pender County ranked eighth in the state for total animal/vehicle crashes between 2010 and 2012. Overall, 1,386 animal crashes were reported during the 2010 to 2012 time period. This is less than half (44 percent) of the animal/vehicle crashes reported by urbanized Wake County, which is ranked first in the state. New Hanover County ranked 64<sup>th</sup> in the state for total animal/vehicle crashes between 2010 and 2012. Overall, 347 animal crashes were reported during that time period. There are no major animal migration routes noted within the project area. In addition, bridges and overpasses along the proposed project route provide locations for animal crossings. Although animal/vehicle crashes will likely occur as a result of this project, they are no more likely to occur on the proposed project corridor than anywhere else.

Table 4-12 shows the anticipated impacts of the DEIS detailed study alternatives and the preferred alternative on forests within the study area. Impacts reported for the detailed study alternatives in the DEIS double-counted the Coastal Plain Bottomland Hardwood – Blackwater Subtype terrestrial community. Table 4-12 below corrects the error.

Table 4-12. Forest Impacts

	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
<b>Forest Impacts (acres)<sup>1</sup></b>	546.40	506.24	466.45	405.65	454.80

<sup>1</sup>Forest impacts include the following terrestrial communities: Mesic Pine Flatwoods, Wet Pine Flatwoods, Pond Pine Woodland, Xeric Sandhill Scrub, Coastal Plain Bottomland Hardwood – Blackwater Subtype, Nonriverine Wet Hardwood Forest, Pine Savanna, Coastal Plain Small Stream Swamp – Blackwater Subtype, Cypress/Gum Swamp – Blackwater Subtype, and Nonriverine Swamp Forest.

#### 4.5.2.2 AQUATIC COMMUNITIES AND WILDLIFE IMPACTS

Aquatic organisms are very sensitive to the discharges and inputs resulting from construction activities. Impacts usually associated with in-stream construction include increased channelization and scouring of the streambed. In-stream construction alters the substrate and impacts adjacent stream-side vegetation. Such disturbances within the substrate lead to increased siltation that can clog the gills and feeding mechanisms of benthic organisms, fish, and amphibian species. The populations of these organisms are slow to recover and may not do so once a stream has been severely impacted. The anticipated impacts of the detailed study alternatives on streams within the study area are presented in Section 4.5.3.2.1. Section 4.5.3.2.3 presents the anticipated impacts of the detailed study alternatives on wetlands within the study area.

Appropriate measures will be taken to avoid spillage of construction materials and control runoff. Such measures will include an erosion and sedimentation control plan, provisions for disposal and handling of waste materials and storage, stormwater management measures, and appropriate road maintenance measures. NCDOT's *Best Management Practices for Protection of Surface Waters* (BMP-PSW) and Sedimentation Control guidelines will be enforced during the construction stages of the project. Long-term impacts to water resources may include permanent changes to the stream banks and temperature increases caused by the removal of stream-side vegetation.

#### 4.5.3 WATER RESOURCES IMPACTS

Primary sources of water quality degradation in urban and developed areas are non-point sources of discharge, which include surface water runoff and runoff from construction activities. Short-term impacts to water quality from construction-related activities include increased sedimentation and turbidity in nearby water resources. Long-term impacts include substrate destabilization, bank erosion, increased turbidity, altered flow rates, and possible temperature fluctuations within the channel due to removal of streamside vegetation.

The removal of streamside vegetation and placement of fill material during construction contributes to erosion and possible sedimentation. Erosion and sedimentation may carry soils, toxic compounds, trash, and other materials into the aquatic communities at the construction site. As a result, sand bars may be formed both at the site and downstream. Increased light penetration from the removal of streamside vegetation may also increase water temperatures. Warmer water contains less oxygen, thus reducing aquatic life that depends on high oxygen concentrations. Quick revegetation of these areas helps to reduce the impacts by supporting the underlying soils.

The proposed project will impact streams, wetlands, and other surface waters, as described in the sections below. Construction activities associated with the project will strictly follow NCDOT's *Best Management Practices for Construction and Maintenance Activities* (BMP-CMA) and *Protection of Surface Waters* (BMP-PSW). Sedimentation control guidelines will be strictly enforced during the construction stages of the project.

#### **4.5.3.1 GROUNDWATER IMPACTS**

Impacts to groundwater aquifers are not anticipated as a result of the proposed project.

##### **4.5.3.1.1 WELLS**

No right-of-way acquisition or construction will occur within a 100-foot radius around the Belvedere Subdivision well and access to the well site will be maintained. The well is located between existing US 17 and Belvedere Drive.

The DEIS indicated that Military Cutoff Road Extension Alternative M1 would cross two existing CFPWA well sites (located on the east side of the proposed roadway north of Torchwood Boulevard on the groundwater nanofiltration water treatment plant property) and Alternative M2 would cross four existing well sites and a proposed well site. In response to agency comments on the DEIS, additional studies on the potential impacts of the proposed project on groundwater water supply resources and CFPWA infrastructure were conducted. The studies were documented in a February 2012 Evaluation of Impacts to Public Water Supply Groundwater Wells and a May 2012 Memorandum serving as an addendum to the February 8, 2012 Evaluation, appended by reference.

Based on the results of these additional studies and in accordance with State regulations for public water supply wells (see Section 3.5.3.1.1), the alignments of both Alternatives M1 and M2 have been modified since completion of the DEIS so that they will be located a minimum of 100 feet away from existing wellheads and in most cases, much greater distances. Table 4-13 provides a summary of the existing CFPWA wells in the vicinity of Military Cutoff Road Extension Alternatives M1 and M2, as well as the distance from the proposed project to the wells.

Table 4-13. Summary of CFPWA Wells in the Vicinity of Military Cutoff Road Extension

Well Site	Well ID	Well Depth (ft.)	Aquifer	WHPP Radius (ft.)	Yield (gpm)	Closest MCRE <sup>1</sup> Alternative	Distance from Wellhead to MCRE Slope Stake Limits (ft.)	Distance from Wellhead to MCRE Right-of-Way Limits (ft.)
P	8	160	Peedee	2,000	600	M1, M2	807	776
Q	16	175	Peedee	3,000	500	M1, M2	1,936	1,958
B	22	170	Peedee	3,000	900	M1, M2	126	118
A	23	170	Peedee	3,000	1,000	M1, M2	1,762	1,749
M	28	175	Peedee	2,000	750	M1, M2	568	524
N	29	175	Peedee	2,000	750	M1, M2	797	764
O	30	175	Peedee	2,000	570	M1, M2	1,006	974
A	A-CH	95	Castle Hayne	2,965	600	M1, M2	1,654	1,641
B	B-CH	80	Castle Hayne	3,097	640	M1, M2	134	123
C	C-CH	105	Castle Hayne	2,406	600	M2	1,402	1,333
C	C-PD	168	Peedee	3,000	570	M2	1,379	1,309
F	F-CH	105	Castle Hayne	2,273	600	M2	764	727
F	F-PD	170	Peedee	3,000	570	M2	770	744
G	G-CH	90	Castle Hayne	2,440	500	M2	523	471
G	G-PD	173	Peedee	3,000	570	M2	546	494
H	H-CH	100	Castle Hayne	2,471	600	M2	184	152
H	H-PD	175	Peedee	3,000	570	M2	160	128
I	I-CH	95	Castle Hayne	2,206	400	M2	2,109	2,095
I	I-PD	175	Peedee	3,000	570	M2	2,081	2,067
J	J-CH	100	Castle Hayne	2,493	600	M2	546	521
J	J-PD	175	Peedee	3,000	570	M2	573	548
K	K-CH	100	Castle Hayne	2,713	200	M1, M2	1,334	1,304
K	K-PD	175	Peedee	3,000	600	M1, M2	1,272	1,241
L	L-CH	85	Castle Hayne	3,054	500	M2	805	784
L	L-PD	170	Peedee	3,000	640	M2	789	763

<sup>1</sup>MCRE-Military Cutoff Road Extension

With the modified alignments, neither Military Cutoff Road Extension alternative will cross any existing or future CFPUA well sites. The DEIS detailed study alternatives and the preferred alternative are not expected to result in impacts to the CFPUA's groundwater water supply wells. In addition, impacts to the availability of the water supply are not anticipated as a result of the proposed project, and the project is not expected to decrease the capacity of the existing and planned water supply infrastructure or the source aquifers.

The DEIS indicated Alternative U would impact three existing transient non-community water supply wells in the vicinity of the proposed US 17 interchange at Sidbury Road and Scotts Hill Loop Road. Measures incorporated into the design of this proposed interchange to minimize impacts to historic resources also resulted in the avoidance of one of the wells. Transient non-community wells serve 25 or more people at least 60 days out of the year at facilities such as restaurants and churches.

For any private wells that are taken by the proposed project, during the right-of-way acquisition process NCDOT will compensate property owners for the expense of drilling a new well or connecting to a public water system, as appropriate. If an alternate water supply is not available for a property, NCDOT will purchase the property and provide relocation assistance.

Both Alternatives M1 and M2 would cross potable and raw water lines. Any impacted water lines would be relocated as part of the proposed project and returned to service. NCDOT will coordinate with CFPUA on utility impacts resulting from the proposed project.

The NCDENR Public Water Supply Section recommended NCDOT coordinate with local emergency personnel to discuss potential hazardous material spills in the wellhead protection area established by CFPUA. NCDOT met with local emergency response organization representatives on June 5, 2013. Additional protection measures for the wellhead protection area were discussed at the meeting. Measures requiring NCDOT participation are identified in the project commitments section of this FEIS and include the following:

- Areas within 750 feet of Cape Fear Public Utility Authority (CFPUA) wellheads will be treated as environmentally sensitive areas during construction. NCDOT will require the contractor to use orange fencing and post signs to identify these areas as environmentally sensitive. Staging areas and refueling will not be permitted within the environmentally sensitive areas.
- The Special Provisions for the Military Cutoff Road Extension (Project U-4751) will include a requirement for the contractor to educate their employees that project construction is occurring within a wellhead protection area.
- NCDOT will require the contractor for Military Cutoff Road Extension to provide a mobile response spill kit on site during construction. At the end of project construction the kit will be transferred to the Cape Fear Public Utility Authority.

The CFPUA has agreed to provide a place to store the kit at their water treatment plant located adjacent to the proposed Military Cutoff Road Extension.

- Well locations and a 100-foot buffer around the wells will be depicted on final constructions plans for proposed Military Cutoff Road Extension.

#### **4.5.3.2 STREAMS, WETLANDS AND OTHER SURFACE WATER IMPACTS**

##### **4.5.3.2.1 STREAM IMPACTS**

A total of 59 jurisdictional streams are located within the study corridors for the DEIS detailed study alternatives (see Figures 10A through 10K) and NCDOT's preferred alternative (see Figures 16A through 16G). Table 4-14 presents the anticipated impacts by stream for the DEIS detailed study alternatives and the preferred alternative. The stream impacts shown in Table 4-14 for the preferred alternative are based on the revised preliminary design including the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date; however, the impacts shown for the DEIS detailed study alternatives have not been updated since the DEIS. The total stream impacts for each alternative are shown in Table 4-15.

The interchange added north of the Topsail Schools complex with Option 6TR to maintain access along existing US 17 uses reduced design criteria to minimize impacts to RCW habitat and the Topsail Schools complex, and avoid a Pender County water tower. The interchange is anticipated to impact approximately 681 linear feet of streams.

As shown in Table S-1, the impacts to High Quality Waters Watershed (HQQW, ORW, WS Protected or Critical Areas) for the preferred alternative with the revised preliminary design including the additional northern interchange, the proposed service roads, and the Lendire Road improvements, as well as all avoidance and minimization measures incorporated into the proposed project to date, is 20.72 acres. This is higher than the impacts to HQW watershed for the DEIS detailed study alternatives, which ranged from 9.6 acres to 12.4 acres (see Table S-1). As shown in Table 2-11, the incorporation of Option 6TR into the design of the DEIS detailed study alternatives and the preferred alternative increased the impacts to HQW watersheds by 10.9 acres for each alternative. This increase is due to the third lane proposed in each direction between the two northernmost interchanges on US 17 Hampstead Bypass under Option 6TR (see Section 2.8.1.1). As shown on Figures 10I and 16F, this area is located within a HQW watershed.



Table 4-14. Individual Stream Impacts

Stream ID	Stream Name <sup>1</sup>	Figure No.	Corridor Alternative <sup>2</sup>	Stream Impact (feet) <sup>3</sup>	Compensatory Mitigation Required	Stream Determination
BSA	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	295	Yes	Perennial
BSJ	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	153	Yes	Perennial
BSK	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	609	Yes	Perennial
BSL	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	288	Yes	Perennial
BSM	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	732	Yes	Perennial
BSN	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	970	Yes	Perennial
BSO	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	M1 – 2,329 M2 – 2,322 Preferred Alternative – 1,769	Yes	Perennial
BSP	UT to Smith Creek	10C, 16B	M1, M2, Preferred Alternative	M1 – 398 M2 – 328 Preferred Alternative – 281	Yes	Perennial
BSQ	UT to Smith Creek	10C	M1, M2	M1 – 83 M2 – 82	Yes	Perennial
BDITCH1	UT to Howe Creek	10C	M1, M2	613	No <sup>4</sup>	OHWM <sup>6</sup>
					No <sup>5</sup>	
CSA	UT to Island Creek	10D, 16C	E-H, R, U1, M1, Preferred Alternative	E-H, R -1,949 U1 – 2,080 M1 – 2,079 Preferred Alternative – 1,949	Yes	Perennial
CSB	UT to Island Creek	10C, 10D, 16C	E-H, R, U1, M1, Preferred Alternative	E-H, R – 258, M1, U1 – 271 Preferred Alternative – 271	Yes	Perennial
CSC	UT to Smith Creek	10C, 10D	M1	943	No <sup>4</sup>	OHWM <sup>6</sup>
CSD	UT to Smith Creek	10C, 10D, 16B, 16C	M1, Preferred Alternative	M1 – 902 Preferred Alternative – 902 (I) <sup>7</sup>	Yes	Intermittent
					Yes	Perennial

Table 4-14. Individual Stream Impacts *continued*

Stream ID	Stream Name <sup>1</sup>	Figure No.	Corridor Alternative <sup>2</sup>	Stream Impact (feet) <sup>3</sup>	Compensatory Mitigation Required	Stream Determination
CSE	UT to Smith Creek	10C	M1	239	No <sup>4</sup>	OHWM <sup>6</sup>
CSG	UT to Smith Creek	10C, 16B	M1, Preferred Alternative	281	Yes	Intermittent
CSH	UT to Smith Creek	10C, 16B	M1, Preferred Alternative	230	Yes	Intermittent
CSI	UT to Smith Creek	10C, 16B	M1, Preferred Alternative	232	Yes	Perennial
CSJ	UT to Island Creek	10D, 16C	E-H, R, U1, M1, Preferred Alternative	E-H, R -1,290 U1, M1 – 932 Preferred Alternative – 1,290	Yes	Perennial
CSK	UT to Island Creek	10D, 16C	E-H, R, U1, M1, Preferred Alternative	400	Yes	Perennial
DSA	UT to Island Creek	10C	O, U2, M2	O – 359 M2, U2 – 444	Yes	Perennial
ESA	UT to Mill Creek	10G	U1, U2	849	Yes	Perennial
ESB	UT to Mill Creek	10G	U1, U2	130	Yes	Perennial
FSA	UT to Island Creek	10D, 16C	E-H, O, R, U1, M1, Preferred Alternative	E-H, R -2,132 O – 16 M1, U1 – 520 Preferred Alternative – 2,131	Yes	Perennial
FSC	UT to Island Creek	10D	O, U1, U2, M1, M2	O – 53 U1, U2, M1, M2 – 37	Yes	Intermittent
FSE	UT to Island Creek	10D, 16C	E-H, R, Preferred Alternative	331	Yes	Perennial
FSF	UT to Island Creek	10F	R	290	No <sup>4</sup>	OHWM <sup>6</sup>
					No <sup>5</sup>	
FSH	UT to Island Creek	10D, 16C	E-H, Preferred Alternative	E-H – 495 Preferred Alternative – 135 (I)	No <sup>4</sup>	OHWM <sup>6</sup>
					No <sup>5</sup>	
					Yes	Intermittent
					Yes	Perennial
FSI	UT to Island Creek	10D, 16C	E-H, R, Preferred Alternative	E-H – 274 R – 267 Preferred Alternative – 274	Yes	Perennial

Table 4-14. Individual Stream Impacts *continued*

Stream ID	Stream Name <sup>1</sup>	Figure No.	Corridor Alternative <sup>2</sup>	Stream Impact (feet) <sup>3</sup>	Compensatory Mitigation Required	Stream Determination
FSJ	UT to Island Creek	10D, 16C	E-H, R, Preferred Alternative	859	Yes	Intermittent
FSK	UT to Island Creek	10F	R	81	Yes	Intermittent
GFSE	UT to Island Creek	10E	O	302	Yes	Perennial
GSA	UT to Island Creek	10F	O, R	418	Yes	Perennial
GSG	UT to Island Creek	10E, 10F	O	190	Yes	Intermittent
HBSAA	UT to Island Creek	10F, 16D	E-H, Preferred Alternative	E-H - 141 Preferred Alternative - 214 (I)	Yes	Intermittent
					Yes	Perennial
HBSC	UT to Island Creek	10F, 16D	E-H, Preferred Alternative	E-H - 369 Preferred Alternative - 350 (P)	Yes	Intermittent
					Yes	Perennial
HBSD(1)	UT to Island Creek	10F, 16D	E-H, Preferred Alternative	E-H - 269 Preferred Alternative - 117 (P) 161 (I)	Yes	Intermittent
					Yes	Perennial
HBSH	UT to Island Creek	10F, 16D	E-H, Preferred Alternative	320	Yes	Intermittent
HSB	UT to Harrisons Creek	10H	E-H	262.08	Yes	Intermittent
HSC	UT to Harrisons Creek	10F, 10H, 16D, 16E	E-H, Preferred Alternative	E-H - 404 Preferred Alternative - 408	Yes	Perennial
HSX	UT to Harrisons Creek	10H, 16E	E-H, Preferred Alternative	E-H - 306 Preferred Alternative - 310	Yes	Perennial
ISA	UT to Island Creek	10F	O, R	726	Yes	Intermittent
					Yes	Perennial
ISC	UT to Harrisons Creek	10H	O, R	277	Yes	Intermittent
					Yes	Perennial
ISD	UT to Harrisons Creek	10H	O, R	425	Yes	Perennial

Table 4-14. Individual Stream Impacts *continued*

Stream ID	Stream Name <sup>1</sup>	Figure No.	Corridor Alternative <sup>2</sup>	Stream Impact (feet) <sup>3</sup>	Compensatory Mitigation Required	Stream Determination
IDITCH1	UT to Harrisons Creek	10F	O, R	397	No <sup>4</sup>	OHWM <sup>6</sup>
LSB	UT to Harrisons Creek	10H, 16E	E-H, O, R, Preferred Alternative	E-H, O, R – 1,398 Preferred Alternative – 1,499	Yes	Perennial
LSC	Harrisons Creek	10H, 16E, 16F	E-H, O, R, Preferred Alternative	E-H, O, R – 656 Preferred Alternative – 861	Yes	Perennial
LSCA	UT to Harrisons Creek	10H, 16E	E-H, O, R, Preferred Alternative	E-H, O, R – 442 Preferred Alternative – 107 (P) 336 (I)	Yes	Intermittent
					Yes	Perennial
LSCAA	UT to Harrisons Creek	10H, 16E	E-H, O, R, Preferred Alternative	E-H, O, R – 209 Preferred Alternative – 206	Yes	Perennial
LSCB	UT to Harrisons Creek	10H, 16E	E-H, O, R, Preferred Alternative	E-H, O, R – 307 Preferred Alternative – 298	Yes	Perennial
LSCC	UT to Harrisons Creek	10H, 16E, 16F	E-H, O, R, Preferred Alternative	E-H, O, R – 131 Preferred Alternative – 273	Yes	Perennial
LSCF	UT to Harrisons Creek	10H, 16E	E-H, O, R, Preferred Alternative	120	Yes	Intermittent
LSD	Godfrey Creek	10H, 10I, 16E, 16F	E-H, O, R, Preferred Alternative	E-H, O, R – 285 Preferred Alternative – 278	Yes	Perennial
LSDA	UT to Godfrey Creek	10I, 16F	E-H, O, R, Preferred Alternative	195	Yes	Intermittent

Table 4-14. Individual Stream Impacts *continued*

Stream ID	Stream Name <sup>1</sup>	Figure No.	Corridor Alternative <sup>2</sup>	Stream Impact (feet) <sup>3</sup>	Compensatory Mitigation Required	Stream Determination
NSA	UT to AIWW <sup>8</sup>	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	E-H, O, R, U1, U2 – 442 Preferred Alternative – 110 (P) 344 (I)	Yes	Intermittent
					Yes	Perennial
NSF	UT to AIWW <sup>8</sup>	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	E-H, O, R, U1, U2 – 105 Preferred Alternative – 290 (P) 483 (I)	Yes	Intermittent
					Yes	Perennial
ZSB	UT to Futch Creek	10E	U1, U2	386	Yes	Perennial
ZSK	UT to Prince George Creek	10D, 16C	E-H, R, Preferred Alternative	E-H, R – 849 Preferred Alternative – 850	Yes	Perennial
ZSL	UT to Prince George Creek	10D, 16C	E-H, R, Preferred Alternative	40	Yes	Perennial

<sup>1</sup>Smith Creek, Island Creek, Prince George Creek, Harrisons Creek, and Godfrey Creek are classified C; Sw. Nixons Creek and Old Topsail Creek are classified SA; HQW.

<sup>2</sup>U1 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M1. U2 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M2.

<sup>3</sup>Impacts are for all alternatives unless otherwise noted. Individual impacts calculated for Military Cutoff Road Extension Alternatives M1 and M2 use the corresponding Hampstead Bypass Alternative U interchange configuration.

<sup>4</sup>Tributary feature exists within the boundaries of an adjacent wetland and therefore does not require mitigation independent of the wetland.

<sup>5</sup>Tributary feature does not require stream mitigation but may require mitigation by USACE as a 'Water of the US' dependent upon the type of impact proposed at the time of permit application.

<sup>6</sup>Resource determined by USACE to be a jurisdictional tributary based on the presence of an ordinary high water mark (OHWM) during field verification.

<sup>7</sup>Potentially Mitigable Tributary

<sup>8</sup>Atlantic Intracoastal Waterway.

Table 4-15. Total Stream Impacts

Delineated Stream Impacts (linear feet)	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
Perennial	17,972	11,486	18,634	11,755	7,687
Intermittent	4,580	1,346	2,553	997	486
Other <sup>1</sup>	0 <sup>2</sup>	1,010	3,384	2,698	613
<b>Total</b>	<b>22,552</b>	<b>13,842</b>	<b>24,571</b>	<b>15,450</b>	<b>8,786</b>

<sup>1</sup>Tributary waters determined to be jurisdictional based on the presence of an ordinary high water mark (OHWM). These waters are classified as 'Waters of the US' (impacts calculated in square feet) and will not require compensatory mitigation.

<sup>2</sup>Impacts to streams denoted as OHWM by the Preferred Alternative are included in Table 4-16 below.

#### 4.5.3.2.2 SURFACE WATER IMPACTS

Seventeen ponds are located within the study corridors for the DEIS detailed study alternatives (see Figures 10A through 10K) and NCDOT's preferred alternative (see Figures 16A through 16G). Table 4-16 presents the anticipated impacts for each pond for the DEIS detailed study alternatives and the preferred alternative. The pond impacts shown in Table 4-16 for the preferred alternative are based on the revised preliminary design including the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date; however, the impacts shown for the DEIS detailed study alternatives have not been updated since the DEIS. Table 4-16 also summarizes the preferred alternative's impacts to tributary waters determined to be jurisdictional based on the presence of an ordinary high water mark (OHWM). These impacts were included under stream impacts in the DEIS. The total surface water impacts for each alternative are shown in Table 4-17.

Table 4-16. Individual Surface Water Impacts

Feature ID	Appearance or Name	Corridor Alternative(s) <sup>1</sup>	Figure No.	Connection or Compensatory Mitigation Requirement	Impacts <sup>2</sup>	Additional Information
BPE	Stormwater Pond	M1, M2, Preferred Alternative	10C, 16B	BSL	0.75 acres	Permit No. SW8 000214
BPF	Stormwater Pond	M1, M2, Preferred Alternative	10C, 16B	BSO	0.41 acres	Permit No. SW8 040426
BPJ	Stormwater Pond	M1, M2, Preferred Alternative	10C, 16B	No Connection	M1, M2 – 0.11 acres Preferred Alternative – 0.02 acres	Permit No. SW8 960902
BPK	Stormwater Pond	M1, M2, Preferred Alternative	10B, 16B	No Connection	M1, M2 – 0.01 acres Preferred Alternative – 0.0009 acres	No record of permit
BDITCH1	UT to Howe Creek <sup>3</sup>	Preferred Alternative	16B	Compensatory Mitigation not Required <sup>4,5</sup>	2,380 sq. ft./ 0.055 acres	OHWM <sup>6</sup>
CSC	UT to Smith Creek <sup>3</sup>	Preferred Alternative	16C	Compensatory Mitigation not Required <sup>4</sup>	9,430 sq. ft./ 0.216 acres	OHWM <sup>6</sup>
CSD	UT to Smith Creek <sup>3</sup>	Preferred Alternative	16B, 16C	Compensatory Mitigation not Required <sup>5</sup>	12,263 sq. ft./ 0.282 acres	OHWM <sup>6</sup>
CSE	UT to Smith Creek <sup>3</sup>	Preferred Alternative	16C	Compensatory Mitigation not Required <sup>4</sup>	1,912 sq. ft./ 0.044 acres	OHWM <sup>6</sup>
GPA	Stormwater Pond	O	10F	GWA	0.09 acres	
GPB	Stormwater Pond	O, R	10F	GWA	0.07 acres	
GPC	Stormwater Pond	O, R	10F	GWA	O – 0.11 acres R – 0.06 acres	
GPD	Stormwater Pond	O, R	10F	No Connection	0.01 acres	
IPA2	Stormwater Pond	O, R	10F	IWT	0.14 acres	

Table 4-16. Individual Surface Water Impacts *continued*

Feature ID	Appearance or Name	Corridor Alternative(s) <sup>1</sup>	Figure No.	Connection or Compensatory Mitigation Requirement	Impacts <sup>2</sup>	Additional Information
IPE	Stormwater Pond	E-H, O, R, Preferred Alternative	10H, 16E	No Connection	0.27 acres	No record of permit
JPD	Cypress/ Gum Depression	E-H, O, R, U1, U2, Preferred Alternative	10I, 16F	KWG	E-H, O, R – 1.68 acres U1, U2 – 1.65 acres Preferred Alternative – 1.71 acres	
KPB	Cypress/ Gum Depression	E-H, O, R, U1, U2, Preferred Alternative	10I, 16F	KWA/KWG	E-H, O, R – 0.31 acres U1, U2 – 0.55 acres Preferred Alternative – 0.34 acres	
KPC	Manmade/ Maintained	U1, U2	10I	KWF	0.18 acres	
KDITCH	UT to Godfrey Creek	Preferred Alternative	16F	Compensatory Mitigation not Required	625 sq. ft/ 0.014 acres	OHWM <sup>6</sup>
LPB	Manmade/ Maintained	Preferred Alternative	16E, 16F	LWF	0.38 acres	
LPD	Manmade/ Maintained	E-H, O, R, Preferred Alternative	10H, 16E	LWA	0.02 acres	
LPE	Manmade/ Maintained	E-H, O, R, Preferred Alternative	10H, 16E, 16F	No Connection	E-H, O, R – 0.23 acres Preferred Alternative – 0.36 acres	
NPA	Small Borrow Pond	Preferred Alternative	16G	No Connection	0.01 acres	
NPC	Stormwater Pond	E-H, O, R, U1, U2, Preferred Alternative	10I, 16G	No Connection	0.06 acres	Permit No. SW8 040431



Table 4-16. Individual Surface Water Impacts *continued*

Feature ID	Appearance or Name	Corridor Alternative(s) <sup>1</sup>	Figure No.	Connection or Compensatory Mitigation Requirement	Impacts <sup>2</sup>	Additional Information
NPE	Water Treatment Pond	E-H, O, R, U1, U2, Preferred Alternative	10I, 16G	No Connection	E-H, O, R, U1, U2 – 0.05 acres Preferred Alternative – 0.70 acres	
FSH	UT to Island Creek <sup>3</sup>	Preferred Alternative	16C	Compensatory Mitigation not Required <sup>5</sup>	2,328 sq. ft./ 0.053 acres	OHW <sup>6</sup>
FSH	UT to Island Creek <sup>3</sup>	Preferred Alternative	16C	Compensatory Mitigation not Required <sup>4</sup>	906 sq. ft./ 0.021 acres	OHW <sup>6</sup>
NDITCH1 <sup>7</sup>	UT to Old Topsail Creek <sup>3</sup>	Preferred Alternative	16G	Compensatory Mitigation not Required <sup>4,5</sup>	1,558 sq. ft./ 0.036 acres	OHW <sup>6</sup>
ZTRIB1 <sup>7</sup>	UT to Old Topsail Creek <sup>3</sup>	Preferred Alternative	16F	Compensatory Mitigation not Required <sup>4</sup>	181 sq. ft./ 0.004 acres	OHW <sup>6</sup>

<sup>1</sup>U1 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M1. U2 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M2.

<sup>2</sup>Impacts are for all alternatives unless otherwise noted. Individual impacts calculated for Military Cutoff Road Extension Alternatives M1 and M2 use the corresponding Hampstead Bypass Alternative U interchange configuration.

<sup>3</sup>Howe Creek is classified SA; ORW. Old Topsail Creek is classified as SA; HQW. Island Creek and Smith Creek are classified C; Sw.

<sup>4</sup>Tributary feature exists within the boundaries of an adjacent wetland and therefore does not require mitigation independent of the wetland.

<sup>5</sup>Tributary feature does not require stream mitigation but may require mitigation by USACE as a 'Water of the US' dependent upon the type of impact proposed at the time of permit application.

<sup>6</sup>Tributary waters determined to be jurisdictional based on the presence of an ordinary high water mark (OHWM). These waters are classified as 'Waters of the US' (impacts calculated in sq. ft.) and will not require compensatory mitigation.

<sup>7</sup>ZTRIB1 and NDITCH1 were added during Jurisdictional review based on current site conditions.

Table 4-17. Total Surface Water Impacts

	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
• Ponds with a connection to tributary waters (acres)	3.61	1.90	1.76	1.89	1.89
• Ponds with no connection to tributary waters (acres)	1.42	2.42	2.42	1.88	1.88
• Tributary waters determined to be jurisdictional based on the presence of an OHWM <sup>1</sup> (square feet/acres)	31,583/ 0.725	Included in stream impacts in DEIS	Included in stream impacts in DEIS	Included in stream impacts in DEIS	Included in stream impacts in DEIS

<sup>1</sup>Tributary waters determined to be jurisdictional based on the presence of an ordinary high water mark (OHWM). These waters are classified as 'Waters of the US' (impacts calculated in sq. ft.) and will not require compensatory mitigation.

#### 4.5.3.2.3 WETLAND IMPACTS

One hundred and seventeen (117) jurisdictional wetlands are located within the study corridors for the DEIS detailed study alternatives (see Figures 10A through 10K) and NCDOT's preferred alternative (see Figures 16A through 16G). Table 4-18 presents the anticipated impacts by wetland for the DEIS detailed study alternatives and the preferred alternative. The wetland impacts shown in Table 4-18 for the preferred alternative are based on the revised preliminary design including the additional northern interchange, the ten proposed service roads, and the Lendire Road improvements, as well as avoidance and minimization measures incorporated to date; however, the impacts shown for the DEIS detailed study alternatives have not been updated since the DEIS. The total wetland impacts for each alternative are shown in Table 4-19.

As shown in Table 4-19, the estimated wetland impacts for the preferred alternative are 261.19 acres, which includes 13.04 acres of impacts from the ten proposed service roads (see Table 2-10). This is an increase of 15.14 acres over the wetland impacts for Alternative M1+E-H from the DEIS, which were 246.05 acres (see Table 2-3). As shown in Table 2-11, the additional northern interchange associated with the revised preliminary design increased the wetland impacts for the preferred alternative by 17.89

acres. However, when other avoidance and minimization measures incorporated into the design of the preferred alternative are considered, the current wetland impacts are only 2.10 acres over the impacts for Alternative M1+E-H from the DEIS, before inclusion of the proposed service roads wetland impacts.

Table 4-18. Individual Wetland Impacts

<b>Wetland ID</b>	<b>Figure No.</b>	<b>Corridor Alternative(s)<sup>1</sup></b>	<b>Cowardin Classification<sup>2</sup></b>	<b>Hydrologic Classification</b>	<b>NCDWR Wetland Rating</b>	<b>Wetland Impacts (acres)<sup>3</sup></b>
BWB	10C, 16B	M1, M2, Preferred Alternative	PFO4B	Non-riparian	27	0.23
BWC	10C, 16B	M1, M2, Preferred Alternative	PFO	Non-riparian	25	0.18
BWD	10C, 16B	M1, M2, Preferred Alternative	PFO	Non-riparian	34	M1, M2 – 1.90 Preferred Alternative – 1.71
BWI	10C, 16B	M1, M2, Preferred Alternative	PFO1/3/4B	Non-riparian	34	M1 – 1.66 M2 – 1.89 Preferred Alternative – 0.88
CWA	10C, 16B	M1, M2, Preferred Alternative	PFO3/4A	Non-riparian	34	M1 – 6.37 M2 – 4.80 Preferred Alternative – 6.51
CWB	10C, 10D, 16B, 16C	M1, E-H, R, U1, Preferred Alternative	PSS3/4B	Non-riparian	36	E-H, R – 1.11 M1 – 12.52 U1 – 1.06 Preferred Alternative – 14.76
CWD	10D, 16C	E-H, R, U1, Preferred Alternative	PSS3/4Bd	Non-riparian	36	E-H, R – 7.51 U1 – 9.82 Preferred Alternative – 7.51
CWE	10D, 16C	E-H, R, U1, Preferred Alternative	PFO3/4Bg	Non-riparian  Riparian	36	E-H, R – 36.83 U1 – 23.89 Preferred Alternative – 36.83 (NR)

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
CWF	10C, 10D, 16C	E-H, O, R, U1, U2, Preferred Alternative	PFO3/4B	Non-riparian	36	E-H, R – 21.52 O – 2.11 U1 – 7.23 U2 – 1.05 Preferred Alternative – 20.42
DWC	10C, 10D, 10E, 16C	E-H, M2, O, R, U1, U2, Preferred Alternative	PSS3/4B	Non-riparian	36	E-H, R – 0.13 O – 92.65 U1 – 0.12 M2 – 92.50 U2 – 77.36 Preferred Alternative – 0.07
EWF	10E	U1, U2	PFO	Riparian	14	0.37
EWH	10G	U1, U2	PFO	Non-riparian	20	1.18
EWH1	10G	U1, U2	PFO	Riparian	20	1.23
EWI	10G	U1, U2	PFO	Riparian	37	0.53
EWK	10G	U1, U2	PSS1C	Non-riparian	25	0.06
EWM	10G	U1, U2	PF01C	Riparian	19	5.26
FWA	10C, 10D	O, U1, U2	PFO	Non-riparian	30	O – 0.67 U1 – 0.45 U2 – 0.48
FWB	10D, 16C	E-H, R, Preferred Alternative	PFO	Riparian	20	5.01
FWC <sup>4</sup>	10D, 10F, 16C, 16D	E-H, R, Preferred Alternative	PFO	Non-riparian	48	E-H – 1.46 R – 8.24 Preferred Alternative – 1.45 (R)
				Riparian		
FWD	10F	R	PSS3B	Non-riparian	28	7.36

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
FWF	10F, 16D	E-H, Preferred Alternative	PFO	Non-riparian	37	E-H – 6.89 Preferred Alternative – 5.83 (NR) 1.08 (R)
				Riparian		
FWHB	10F, 16D	E-H, Preferred Alternative	PFO	Non-riparian	24	0.04
FWI	10F, 16C, 16D	E-H, Preferred Alternative	PFO	Non-riparian	17	0.38
FWL	10F, 16D	E-H, Preferred Alternative	PFO	Non-riparian	19	0.03
FWY	10D, 16C	E-H, R, Preferred Alternative	PFO	Non-riparian	20	0.18
GWA	10F	O, R	PEM/PSS	Riparian	61	O – 6.05 R – 7.94
GWC	10C, 10D, 10E	O, U1, U2	PFO	Non-riparian	32	O – 75.81 U1 – 0.68 U2 – 27.17
GWD	10E, 10F	O	PFO	Non-riparian	32	4.53
				Riparian		
HBAA <sup>5</sup>	10F, 16D	E-H, Preferred Alternative	PSS/PFO	Riparian	32	E-H – 0.06 Preferred Alternative – 0.25
HBAB	10F, 16D	E-H, Preferred Alternative	PSS/PFO	Non-riparian	27	1.09
HBWD <sup>6</sup>	10F, 16D	E-H, Preferred Alternative	PSS/PFO	Riparian	83	E-H – 1.14 Preferred Alternative – 1.19
HBWF	10F, 16D	E-H, Preferred Alternative	PEM/PSS	Riparian	32	E-H – 0.76 Preferred Alternative – 0.78
HBWK <sup>7</sup>	10F, 16D	E-H, Preferred Alternative	PFO/PSS	Riparian	83	1.47
HBWT	10F, 16D	E-H, Preferred Alternative	PSS	Non-riparian	14	0.39

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
HWB	10H, 16E	E-H, Preferred Alternative	PFO	Riparian	50	E-H – 2.36 Preferred Alternative – 2.31
HWD	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	21	0.35
HWG <sup>8</sup>	10H, 16E	E-H, Preferred Alternative	PFO/PSS	Riparian	15	E-H – 0.88 Preferred Alternative – 0.87 (R)
				Non-riparian		
HWH	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	0.15
HWH1	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	E-H – 0.09 Preferred Alternative – 0.08
HWH2	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	0.03
HWH3	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	0.07
HWH4	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	0.02
HWH5	10H, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	0.23
HWY	10F, 10H, 16D, 16E	E-H, Preferred Alternative	PFO	Non-riparian	26	E-H – 0.23 Preferred Alternative – 0.17
HWZ	16D, 16E	Preferred Alternative	PFO	Non-riparian	21	0.01
HWAA <sup>9</sup>	10F, 16D	E-H, Preferred Alternative	PFO	Non-riparian	40	E-H – 15.40 Preferred Alternative – 8.52 (NR) 1.64 (R)
				Riparian		
HWEE	10F	E-H	PFO	Riparian	25	0.15
HWHH	10F, 16D	E-H, Preferred Alternative	PFO	Non-riparian	34	E-H – 0.24 Preferred Alternative – 0.90

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
HWMX	10F, 10H, 16D, 16E	E-H, Preferred Alternative	PFO	Non-riparian	40	0.05
IWA	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	80	0.03
IWA_MM	10F, 10H	O, R	PFO	Non-riparian	39	4.81
IWB	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	25	0.09
IWC	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	20	E-H, O, R – 0.13 Preferred Alternative – 0.21
IWD	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Non-riparian	31	O, R – 17.43 E-H – 18.64 Preferred Alternative – 17.71 (NR) 0.39 (R)
				Riparian		
IWE	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Non-riparian	13	0.16
IWF <sup>10</sup>	10H	O, R	PFO	Riparian	69	7.61
				Non-riparian		
IWH <sup>11</sup>	10H	O, R	PFO	Non-riparian	53	7.67
				Riparian		
IWK	10F	O, R	PFO	Riparian	77	7.30
				Non-riparian		
IWN	10F	O, R	PFO	Riparian	79	4.89
IWQ	10F	O, R	PFO	Non-riparian	7	0.48
IWT <sup>12</sup>	10F	O, R	PFO	Non-riparian	41	14.57
				Riparian		
IWU	10F	O, R	PFO	Non-riparian	13	0.29
IWV	10F	O, R	PFO	Non-riparian	42	4.81
IWW	10F	O, R	PFO	Non-riparian	45	10.38
JWKX	16F	Preferred Alternative	Non-Riverine Swamp Forest <sup>15</sup>	Non-riparian	14	1.90

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
KWA	10I	U1, U2	PFO3/4B	Non-riparian	30	2.27
KWC	10I	U1, U2	PFO1/2C	Non-riparian	17	4.47
KWD	10G, 10I	U1, U2	PFO4A	Non-riparian	26	4.73
KWF	10I	U1, U2	PFO/PSS	Non-riparian	45	6.01
KWG	10I, 16F	E-H, O, R, U1, U2, Preferred Alternative	PFO1/2G	Non-riparian	43	E-H, O, R – 0.57 U1, U2 – 2.88 Preferred Alternative – 0.71
KWH <sup>13</sup>	10I	U1, U2	PFO1/2C	Non-riparian	42	5.70
KWI	10G	U1, U2	PFO1/3/4B	Non-riparian	49	32.18
KWN	10G	U1, U2	PFO4B	Non-riparian	46	24.01
KWO	10G	U1, U2	PFO4B	Non-riparian	37	18.02
KWS	10I	U1, U2	PFO1/4B	Non-riparian	33	0.52
LWA	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	70	0.13
LWB	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	72	E-H, O, R – 7.81 Preferred Alternative – 8.36
LWD	10H, 16E, 16F	E-H, O, R, Preferred Alternative	PFO	Riparian	83	E-H, O, R – 5.86 Preferred Alternative – 5.84
LWD1	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	48	0.08
LWE	10H, 16E, 16F	E-H, O, R, Preferred Alternative	PFO	Non-riparian	29	E-H, O, R – 8.22 Preferred Alternative – 0.49
LWF	16E, 16F	Preferred Alternative	PFO	Non-riparian	11	0.10



Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
LWG	10H, 16E, 16F	E-H, O, R, Preferred Alternative	PFO	Non-riparian	46	E-H, O, R – 0.17 Preferred Alternative – 0.01
LWH	10H, 16E, 16F	E-H, O, R, Preferred Alternative	PFO	Non-riparian	23	E-H, O, R – 0.20 Preferred Alternative – 0.01
LWI	10H, 10I, 16E, 16F	E-H, O, R, Preferred Alternative	PFO	Riparian	80	2.50
LWJ	10I, 16F	E-H, O, R, Preferred Alternative	PFO	Non-riparian	40	E-H, O, R – 5.26 Preferred Alternative – 5.51
LWK	16F	Preferred Alternative	PFO	Riparian	78	0.36
LWL	16F	Preferred Alternative	PFO	Riparian	76	0.28
MWA	16G	Preferred Alternative	PSS/PFO	Non-riparian	36	0.00
MWM(2)	10H, 16E	E-H, O, R, Preferred Alternative	PFO	Riparian	68	E-H, O, R – 2.70 Preferred Alternative – 2.61 (NR) 0.09 (R)
				Non-riparian		
NWA	16G	Preferred Alternative	PFO	Non-riparian	12	0.01
NWB	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PEM/PFO	Non-riparian	13	E-H, O, R, U1, U2 – 0.02 Preferred Alternative – 0.04
NWE	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PEM/PFO	Non-riparian	12	0.03

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
NWF	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PEM/PSS	Non-riparian	12	E-H, O, R, U1, U2 – 0.04 Preferred Alternative – 0.05
NWJ	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PSS/PFO	Non-riparian	12	E-H, O, R, U1, U2 – 0.02 Preferred Alternative – 0.10
NWK	10K, 16G	U1, U2, Preferred Alternative	PSS	Non-riparian	12	U1, U2 – 0.02 Preferred Alternative – 0.04
NWM	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO	Non-riparian	22	E-H, O, R, U1, U2 – 0.68 Preferred Alternative – 1.01
NWO	10I, 16F	E-H, O, R, Preferred Alternative	PFO4	Non-riparian	17	E-H, O, R – 3.11 Preferred Alternative – 3.69
NWP	10I, 16F, 16G	E-H, O, R, U1, U2, Preferred Alternative	PSS	Non-riparian	17	E-H, O, R – 29.13 U1, U2 – 11.38 Preferred Alternative – 36.69
ZWJ	10E	U1, U2	PFO	Non-riparian	26	1.37
ZWK	10E	U1, U2	PEM	Non-riparian	16	0.08
ZWL	10G	U1, U2	PFO	Non-riparian	20	0.24
ZWM	10G	U1, U2	PFO	Non-riparian	20	0.04
ZWY	10C	M1, M2	PFO	Non-riparian	10	0.04
ZWCC	10K, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO	Riparian	28	E-H, O, R, U1, U2 – 0.03 Preferred Alternative – 0.06

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
ZWDD	10D, 16C	E-H, R, Preferred Alternative	PFO	Non-riparian	26	E-H, R – 1.16 Preferred Alternative – 0.92 (NR) 0.24 (R)
				Riparian		
PD-01 <sup>14</sup>	10C	M1, M2	PFO/PSS	Non-riparian	N/A	0.07
PD-03	10C, 16B	M1, M2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	7.21
PD-04	10C, 16B	M1, M2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	M1, M2 – 6.42 Preferred Alternative – 5.76
PD-11	16G	Preferred Alternative	PFO/PSS	Non-riparian	N/A	0.04
PD-15	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 0.48 Preferred Alternative – 0.53
PD-16	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 0.58 Preferred Alternative – 0.63
PD-29	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R – 8.58 U1, U2 – 8.56 Preferred Alternative – 9.52
PD-31	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 2.91 Preferred Alternative – 2.02
PD-32	16G	Preferred Alternative	PFO/PSS	Non-riparian	N/A	2.44
				Riparian	N/A	0.92

Table 4-18. Individual Wetland Impacts *continued*

Wetland ID	Figure No.	Corridor Alternative(s) <sup>1</sup>	Cowardin Classification <sup>2</sup>	Hydrologic Classification	NCDWR Wetland Rating	Wetland Impacts (acres) <sup>3</sup>
PD-33	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 0.82 Preferred Alternative – 7.79 (NR) 0.67 (R)
				Riparian		
PD-34	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 1.08 Preferred Alternative – 2.30
PD-35	10I, 16G	E-H, O, R, U1, U2, Preferred Alternative	PFO/PSS	Non-riparian	N/A	E-H, O, R, U1, U2 – 3.08 Preferred Alternative – 7.24

<sup>1</sup>U1 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M1. U2 is Hampstead Bypass Alternative U starting at an interchange with US 17 Wilmington Bypass at Military Cutoff Road Extension Alternative M2.

<sup>2</sup>Cowardin classifications are based on characteristics of each wetland at the specific time and location of observation. Wetlands having 'No ID' were not characterized due to impacted appearance at the time of observation.

<sup>3</sup>Impacts are for all alternatives unless otherwise noted. Individual impacts calculated for Military Cutoff Road Extension Alternatives M1 and M2 use the corresponding Hampstead Bypass Alternative U interchange configuration.

<sup>4</sup>Includes wetland FEW

<sup>5</sup>Includes wetland HBAC

<sup>6</sup>Bridging at Site 16 reduces wetland impacts to HBWD from 1.71 acres to 1.19 acres.

<sup>7</sup>Includes wetland HBWP; bridging at Site 15 reduces wetland impacts to HBWK from 1.61 acres to 1.47 acres.

<sup>8</sup>Includes wetlands HWM, HWN, HWO

<sup>9</sup>Includes wetlands HWBB, HWII, HWLL

<sup>10</sup>Includes wetland IWG

<sup>11</sup>Includes wetland IWI

<sup>12</sup>Includes wetlands IWR

<sup>13</sup>Includes wetlands KWJ, KWK, and KWL

<sup>14</sup>Delineation data previously verified; no NCDWR wetland rating forms completed for these wetlands.

<sup>15</sup>NCWAM classifications were used for wetlands in extended study areas.

Table 4-19. Total Wetland Impacts

	Alternative				
	M1+E-H (Preferred Alternative)	M2+O	M1+R	M1+U	M2+U
<b>Delineated Wetland Impacts (acres)</b>	261.19	384.42	297.24	218.35	283.77

#### **4.5.4 JURISDICTIONAL ISSUES**

##### **4.5.4.1 WATERS OF THE UNITED STATES**

###### **4.5.4.1.1 AVOIDANCE AND MINIMIZATION OF IMPACTS**

During the development of the project study alternatives, efforts were made to avoid and minimize impacts to wetlands and streams wherever practicable.

Preliminary build alternatives (Section 2.2.4) were established through an evaluation of suitability mapping based on available socioeconomic, cultural, and environmental resource data. Potential corridor alternatives were screened for suitability based on several criteria, including meeting the purpose of and need for the proposed project, minimizing impacts to resources, and consideration of community features. Geographic information system (GIS) data and modeling, aerial photography, and observations from field visits were used in the analysis. Corridor centerlines were drawn to reflect alignments that minimized impacts. Impacts were calculated by section for each alignment and the sections with the least overall impacts were retained and combined into alignment alternative segments.

The segment centerlines were buffered and several 1,000-foot corridor alternatives were generated by merging the segments in different combinations. Roadway alignments were developed and placed within the 1,000-foot corridors to minimize impacts to resources, provide a roadway that is constructible, and crosses roads, streams, and utility easements at a reasonable angle.

Preliminary build alternatives that met the purpose of and need for the proposed project and with the least impacts to the human and natural environments were identified as detailed study alternatives in August 2007 (Section 2.3). Preliminary design plans were developed for alternatives selected for detailed study. The detailed study alternatives selection process incorporated recommendations made by federal and state

environmental regulatory and resource agencies and comments received from two citizens informational workshops held in April 2007.

Because of the number of streams and wetlands present within the study area, total avoidance of surface waters is not practicable. Impacts to wetlands and streams were considered during the selection of the DEIS detailed study alternatives. Alignments for the alternatives were developed within the study corridors that avoid and minimize impacts to streams and wetlands wherever practicable. Prior to the issuance of the DEIS, the NEPA/Section 404 merger team concurred on the wetlands and streams to be bridged by the alternatives.

NCDOT further attempted to avoid and minimize impacts to streams and wetlands to the greatest extent practicable in the selection of its preferred alternative. As discussed in Section 5.1.1, the merger team concurred on NCDOT's recommended preferred alternative (Alternative M1+E-H) as the Least Environmentally Damaging Practicable Alternative (LEDPA) on May 17, 2012 in accordance with the procedures detailed in the NEPA/Section 404 Merger Process<sup>1</sup>. Copies of the signed LEDPA concurrence form are included in Appendix C.

Following selection of Alternative M1+E-H as the preferred alternative for the project, NCDOT made changes to the project design in order to avoid or minimize impacts to wetlands and streams. These changes are listed below and in Section 2.8 of this document.

- 3:1 slopes are proposed in wetland areas and adjacent to streams.
- The project design was modified to incorporate a retaining wall and guardrail to minimize impacts to stormwater ponds in the Food Lion shopping center, located on the west side of existing Military Cutoff Road just south of Market Street.
- Loops and ramps in the Military Cutoff Road Extension interchange at Market Street were tightened, reducing wetland impacts by 0.89 acre. Impacts to a surface water were reduced by 1,911 square feet.
- A retaining wall was added on the west side of the proposed roadway south of

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<sup>1</sup>The merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by the US Army Corps of Engineers (USACE) as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."

Putnam Drive to avoid impacts to wetland PD-01 (-0.07 acre).

- Military Cutoff Road Extension north of Torchwood Boulevard was realigned in the vicinity of the Cape Fear Public Utility Authority's Nano Water Treatment Plant. Wetland impacts were reduced by 0.78 acre and stream impacts were reduced by 677 feet.
- The design was revised at the Military Cutoff Road Extension interchange with the US 17 Wilmington Bypass. The ramp in Quadrant D was pulled in, reducing wetland impacts by 1.16 acres.
- US 17 Hampstead Bypass was realigned in the vicinity of Harrison Creek Road. Wetland impacts were reduced by 4.77 acres. Impacts to streams were reduced by 5.93 linear feet.
- US 17 Hampstead Bypass was realigned in the vicinity of the NC 210 interchange. Wetland impacts were reduced by 0.78 acre and stream impacts were reduced by 258 linear feet.
- US 17 Hampstead Bypass was realigned in the vicinity of Holiday Drive. Wetland impacts were reduced by 7.99 acres. However, the shift results in additional impacts to streams of 332 linear feet.

In addition to the minimization measures listed above, Design Standards for Sensitive Watersheds will be implemented during project construction for all tributaries of streams within the study area designated as HQW or ORW due to the classification of their receiving waters.

As discussed in Section 5.1.1, the merger team concurred on avoidance and minimization measures for the proposed Military Cutoff Road Extension on September 25, 2012. A copy of the signed September 2012 Avoidance and Minimization concurrence form for the Military Cutoff Road Extension is included in Appendix C. The merger team subsequently concurred on avoidance and minimization measures for the proposed US 17 Hampstead Bypass on June 13, 2013, with USEPA abstaining. A copy of the signed June 2013 Avoidance and Minimization concurrence form for the US 17 Hampstead Bypass is also included in Appendix C, along with USEPA's abstention brief.

The merger team discussed avoidance and minimization measures for proposed service roads for the two projects at a merger team meeting on January 22, 2014. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension. The revised Avoidance and Minimization concurrence form for Military Cutoff Road Extension was signed on April 23, 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored.

Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the impacts identified in this FEIS for NCDOT's preferred alternative reflect the incorporation of the agreed upon avoidance and minimization measures for the service roads for both projects. The Project Commitments section also documents the other avoidance and minimization measures discussed above that were incorporated into the preferred alternative.

#### **4.5.4.1.2 COMPENSATORY MITIGATION OF IMPACTS**

The purpose of compensatory mitigation is to replace the lost functions and values from a project's impacts to Waters of the United States, including wetlands.

NCDOT is investigating potential on-site stream and wetland mitigation opportunities for the preferred alternative. On-site mitigation directly adjacent to the project will be used as much as possible in order to provide the maximum possible amount of compensatory mitigation for stream and wetland impacts. Off-site mitigation needed to satisfy the federal Clean Water Act requirements for this project will be provided by the NCDENR Ecosystem Enhancement Program in accordance with the "North Carolina Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument", dated July 28, 2010.

#### **4.5.4.2 BUFFER IMPACTS**

As discussed in Section 3.5.4.2, no North Carolina River Basin Buffer Rules apply to study area streams.

#### **4.5.4.3 PROTECTED SPECIES IMPACTS**

As discussed in Section 3.5.4.3, as of January 24, 2014, the US Fish and Wildlife Service (USFWS) lists 12 federally-protected species for New Hanover County and 13 federally-protected species for Pender County. Following are the biological conclusions rendered for each species based on survey results within the study area; species' habitat descriptions are found in Section 3.5.4.3. Table 4-20 summarizes the federally-protected species listed for New Hanover and Pender Counties and the biological conclusion for this project's likely effect on each species. Pedestrian surveys were initially conducted by qualified biologists for listed plant species within the corridor for the preferred alternative on May 29-30, 2012. Updated pedestrian surveys were conducted by biologists for listed plant species within the corridor for the preferred alternative on June 4-5, 2014.

##### **American alligator**

Biological Conclusion: Not Required

Species listed as threatened due to similarity of appearance do not require Section 7 consultation with USFWS. However, suitable habitat is present for American alligator within the study area in the form of large streams, ponds, and wetland swamps. A



Table 4-20. Federally-Protected Species Effects

Scientific Name	Common Name	Federal Status	County	Biological Conclusion	Alternatives
<i>Alligator mississippiensis</i>	American alligator	T(S/A)	New Hanover Pender	Not Required	--
<i>Chelonia mydas</i>	Green sea turtle	T	New Hanover Pender	No Effect	--
<i>Caretta caretta</i>	Loggerhead sea turtle	T	New Hanover Pender	No Effect	--
<i>Charadrius melodus</i>	Piping plover	T	New Hanover Pender	No Effect	--
<i>Picoides borealis</i>	Red-cockaded woodpecker	E	New Hanover Pender	May Affect, Likely to Adversely Affect	E-H, O, R, U, Preferred Alternative
<i>Acipenser brevirostrum</i>	Shortnose sturgeon	E	New Hanover Pender	No Effect	--
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	E	New Hanover Pender	No Effect	--
<i>Trichechus manatus</i>	West Indian manatee	E	New Hanover Pender	No Effect	--
<i>Schwalbea americana</i>	American chaffseed <sup>1</sup>	E	Pender	No Effect	--
<i>Thalictrum cooleyi</i>	Cooley's meadowrue	E	New Hanover Pender	May Affect, Likely to Adversely Affect	O, R
<i>Carex lutea</i>	Golden sedge <sup>2</sup>	E	New Hanover <sup>2</sup> Pender	May Affect, Likely to Adversely Affect	O, R
<i>Lysimachia asperulaefolia</i>	Rough-leaved loosestrife	E	New Hanover Pender	May Affect, Likely to Adversely Affect	E-H, O, R, U, M1, M2, Preferred Alternative
<i>Amaranthus pumilus</i>	Seabeach amaranth	T	New Hanover Pender	No Effect	--

E – Endangered T – Threatened T(S/A) - Threatened due to Similarity of Appearance

<sup>1</sup>Historic record (the species was last observed in the county more than 50 years ago).

<sup>2</sup>Golden sedge status is “Probable/Potential” for New Hanover County. This species is considered likely to occur in New Hanover County based on presence of Cooley’s meadowrue.

review of North Carolina Natural Heritage Program (NCNHP) data, updated January 8, 2014, indicates no known occurrences within one mile of the study area. An alligator was observed dead in the median of US 17 in the area of Topsail High School by biologists on June 11, 2008.

### **Green sea turtle**

Biological Conclusion: No Effect

Suitable habitat for green sea turtle does not exist within the study area. Waters within the study area are freshwater and do not contain marine grasses. A review of NCNHP data, updated January 8, 2014, indicates no known occurrences within one mile of the study area.

### **Loggerhead sea turtle**

Biological Conclusion: No Effect

Suitable habitat for loggerhead sea turtle, consisting of open ocean, nearshore areas, or coastal beaches, does not exist within the study area. A review of NCNHP data, updated January 8, 2014, indicates no known occurrences within one mile of the study area.

### **Piping plover**

Biological Conclusion: No Effect

Suitable habitat for piping plover does not exist within the study area. A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

### **Red-cockaded woodpecker**

Biological Conclusion: May Affect, Likely to Adversely Affect

Suitable red-cockaded woodpecker (RCW) foraging and nesting/roosting habitat in the form of open, mature stands of longleaf pine is present throughout the study area.

A review of NCNHP data, updated January 8, 2014, indicated two extant element occurrences of RCW within one mile of the study area in New Hanover County and six extant element occurrences of RCW within one mile of the study area in Pender County.

The results of a RCW survey in 2008 and foraging habitat analyses in 2009 (updated in January 2011 and December 2012) indicated that four RCW clusters (cavity trees used by a single group of birds) exist near the northern portion of the proposed US 17 Hampstead Bypass for all of the DEIS detailed study alternatives and the preferred alternative. Three active RCW clusters exist within the boundary of Holly Shelter Game Land and a fourth active cluster exists on private land. The clusters within the game land are part of the Mid-Atlantic Coastal Plain Recovery Unit. The RCWs on the game land are of particular importance because they are part of the primary core recovery

population. The recovery goals are 350 potential breeding groups for this population and current levels are below that number. Holly Shelter Game Land is one of three properties contributing to the primary core recovery population.

The foraging areas (partitions) used by the groups on Holly Shelter Game Land extend onto private land outside the game land. Two of the partitions extend across existing US 17. Efforts to avoid and minimize impacts to this foraging habitat have been ongoing during development of the proposed Hampstead Bypass. Several RCW foraging habitat analyses have been conducted for the project. The foraging habitat analysis was last updated in July and December 2012. Several design changes have occurred in the project, as well, in an effort to reduce impacts.

As discussed in Section 2.8.1, the original proposed northern US 17 Hampstead Bypass interchange (E-H ORIG) was located north of the Topsail Schools complex, near the project terminus between Leeward Lane and Sloop Point Loop Road. However, this design was changed after a foraging habitat analysis conducted in 2009 showed the interchange was located within RCW foraging habitat. The interchange would have resulted in “takes” on two RCW clusters on Holly Shelter Game Land. The Endangered Species Act defines “take” to mean “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” The northern interchange was moved from its location north of the Topsail Schools complex to south of the schools to minimize impacts to RCW foraging habitat. This revised design reduced the number of takes from two to one. The cluster that would still be taken with this revised design does not currently have enough foraging habitat, so any tree removals would be considered a take. This revised design was presented in the DEIS and at the 2011 corridor public hearings.

In addition to moving the northern interchange, a commitment was made in the DEIS that clearing along existing US 17 would not exceed a width of 200 feet in areas where there is adjacent RCW foraging habitat in order to maintain connectivity between foraging habitat partitions.

The additional interchange now proposed north of the Topsail Schools complex with all of the DEIS detailed study alternatives and the preferred alternative will not result in any additional takes of RCW clusters. The interchange uses reduced design criteria to minimize impacts to RCW foraging habitat and the Topsail Schools complex, and to avoid a Pender County water tower. While the interchange avoids foraging habitat, it will impact approximately 681 linear feet of streams, approximately 18 acres of wetlands, and approximately 0.73 acre of ponds. The interchange north of the schools cannot be shifted any further north out of the wetland and stream complex. Such a shift would result in impacts and a take on an additional cluster. There is no design change that could move the interchange east because it would be located in the RCW foraging habitat.

The six lanes now proposed for the northern section of the proposed bypass, including along the portion of existing US 17 between the bypass tie-in and Sloop Point Loop

Road, will not result in additional takes of RCW clusters, even though proposed clearing will exceed 200 feet in some areas.

As discussed previously, the DEIS included a commitment to limit clearing to 200 feet within the foraging partitions along existing US 17. Based on the results of the earlier foraging habitat analyses, any clearing greater than 200 feet would have resulted in the take of an additional cluster. Since completion of the DEIS, new proposed regional RCW Standard for Managed Stability (SMS) foraging habitat guidelines have been developed and USFWS has agreed to their use for this project. The December 2012 foraging habitat analysis used the proposed regional SMS guidelines and found that clearing greater than 200 feet along existing US 17 within the foraging partitions would not result in the take of an additional RCW cluster.

As discussed above, all of the DEIS detailed study alternatives and the preferred alternative would result in takes on one RCW cluster on Holly Shelter Game Land, so the biological conclusion for RCW for the DEIS detailed study alternatives and the preferred alternative is “May Affect, Likely to Adversely Affect.” Therefore, consultation with USFWS regarding the potential effects of the preferred alternative on the federally-protected RCW is required. Informal consultation for the potential effects of the proposed project on RCW has taken place between NCDOT and USFWS since 2006. Informal consultation includes project meetings, NEPA/Section 404 merger team meetings, and correspondence between the agencies. NCDOT will continue to coordinate with USFWS regarding the potential effects of the preferred alternative on the RCW. In its comments on both the 2011 DEIS (see Section 5.5.1.1) and the 2013 SDEIS (see Section 5.5.2.1), USFWS emphasized the fact the Coastal North Carolina Primary Core Population is still far from achieving its minimum size required for delisting (350 potential breeding groups), so the loss of even one potential breeding group is a major concern. The comments from USFWS acknowledged the efforts put forth by NCDOT to reduce the level of take on RCW, but also continued to emphasize the serious nature of addressing the loss of this one group in the upcoming additional coordination.

USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act (ESA). Under Section 7 of the ESA, formal consultation with the US Fish and Wildlife Service (USFWS) regarding the effects of the preferred alternative on the federally-protected red-cockaded woodpecker (RCW) is required.

### **Shortnose sturgeon**

Biological Conclusion: No Effect

Suitable habitat for shortnose sturgeon, consisting of nearshore marine, estuarine, and riverine habitat of large river systems, does not exist within the study area. E-mail correspondence from the North Carolina Division of Marine Fisheries (NCDMF) dated September 12, 2008 indicates that the proposed project will have no effect on shortnose sturgeon.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

### **Atlantic sturgeon**

Biological Conclusion: No Effect

Suitable habitat for Atlantic sturgeon, consisting of estuarine and marine waters, does not exist within the study area.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

### **West Indian manatee**

Biological Conclusion: No Effect

Suitable habitat for West Indian manatee, consisting of canals, sluggish rivers, estuarine habitats, salt water bays, and off-shore areas, does not exist within the study area. Additionally, streams within the study area are not deep enough to support manatee, which require water depths from five to 20 feet deep.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

### **American chaffseed**

Biological Conclusion: No Effect

Suitable habitat for American chaffseed, consisting of open, moist to dryish Mesic Pine Flatwoods, longleaf pine flatlands, Pine Savannas, road cuts, and power line easements, exists within the study area. However, appropriate soil series, consisting of Blaney, Candor, Gilead, Fuquay, Lakeland, and Vacluse soil units, do not exist within the study area. On May 12, 2008, Dale Suiter of USFWS stated the Service does not anticipate this plant to be present within the study area and that surveys for American chaffseed would not be required.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

### **Cooley's meadowrue**

Biological Conclusion: M1+U, M2+U, and M1+E-H (Preferred Alternative) – No Effect; M2+O and M1+R – May Affect, Likely to Adversely Affect

Suitable habitat for Cooley's meadowrue, consisting of plowed firebreaks, roadside ditches and rights-of-way, and power line easements, exists within the study area. Additionally, soils that are loamy fine sand, sandy loam, or fine sandy loam; at least

seasonally moist or saturated, including Foreston, Muckalee, Torhunta, and Woodington soil series, are common within the study area. Biologists visited a reference population of Cooley's meadowrue at the Sandy Run Swamp Savanna on June 3, 2008 prior to conducting surveys of the study area on June 4-5, June 17-18, 2008 and June 2-4, 2009. No individuals of Cooley's meadowrue were observed in Pender County. After the 2008 surveys, a population of Cooley's meadowrue was discovered within the study area in New Hanover County. This population is located adjacent to a gravel driveway off of Sidbury Road approximately 1.75 miles west of US 17. This occurrence has been recorded by NCNHP, and USFWS updated its species list for New Hanover County on August 5, 2009 to include Cooley's meadowrue (previously unlisted for New Hanover County). Additionally, expanded study area was added to the project since the 2008 surveys were conducted. Suitable habitat for Cooley's meadowrue within these additional areas, as well as suitable habitat within the study area in New Hanover County, was surveyed by biologists on June 16-17, 2010. No new populations of Cooley's meadowrue were observed, however, additional stems were identified at the Sidbury Road site. This population of Cooley's meadowrue is located within the study corridor associated with Alternatives O and R. Additional surveys were conducted by biologists on May 29-30, 2012 in areas of suitable habitat for Cooley's meadowrue within the corridor for the preferred alternative. Updated surveys were conducted by biologists on June 4-5, 2014 in areas of suitable habitat for Cooley's meadowrue within the corridor for the preferred alternative. No individuals of Cooley's meadowrue were observed in either survey.

A review of NCNHP data, updated January 8, 2014, indicates the Sidbury Road population as the only occurrence within one mile of the study area.

The biological conclusion for Cooley's meadowrue with DEIS Detailed Study Alternatives M2+O and M1+R is "May Affect, Likely to Adversely Affect" as a result of potential indirect effects associated with the construction of the Hampstead Bypass portion of these alternatives. These indirect effects may include changes in habitat conditions that would negatively impact Cooley's meadowrue, such as hydrologic changes, isolating small populations by roads, or the introduction of invasive species along the roadway. Direct impacts from these alternatives to Cooley's meadowrue are not anticipated. The other DEIS detailed study alternatives and the preferred alternative would have no effect on Cooley's meadowrue.

Informal consultation for Cooley's meadowrue has taken place between NCDOT and USFWS since 2009. NCDOT will continue to coordinate with USFWS regarding the potential effects of the proposed project on Cooley's meadowrue; however, because the preferred alternative will have no effect on Cooley's meadowrue, formal consultation with USFWS for this species is not necessary.

### **Golden sedge**

Biological Conclusion: M1+U, M2+U, and M1+E-H (Preferred Alternative) – No Effect; M2+O and M1+R – May Affect, Likely to Adversely Affect

Suitable habitat for golden sedge, consisting of roadside and drainage ditches or power line rights-of-way where mowing and/or very wet conditions suppress woody plants, is present within the study area. Surveys for golden sedge were conducted June 2-4, 2009. No individuals of golden sedge were observed. USFWS updated its species list for New Hanover County on August 5, 2009 to include golden sedge (previously unlisted for New Hanover County). Suitable habitat for golden sedge within additional study areas, as well as suitable habitat within the study area in New Hanover County, was surveyed by biologists on June 16-17, 2010. No individuals of golden sedge were observed, however, multiple stems of an unidentified sedge were noted growing in close proximity to a population of Cooley's meadowrue adjacent to Sidbury Road. Though surveys were conducted during the appropriate survey window, no fruiting bodies were found on these plants. Because of the close association between golden sedge and Cooley's meadowrue, it was determined there was a high probability for golden sedge to be present at this site. This site is located within the study corridor associated with Alternatives O and R. Suitable habitat within an approximately 0.25 mile range of the Cooley's meadowrue stems identified at the Sidbury Road site was surveyed for golden sedge on May 23, 2011. A variety of sedges with fruiting bodies were present. However, no individuals of golden sedge were observed. Additional surveys were conducted by biologists on May 29-30, 2012 in areas of suitable habitat for golden sedge within the corridor for the preferred alternative. Updated surveys were conducted by biologists on June 4-5, 2014 in areas of suitable habitat for golden sedge within the corridor for the preferred alternative. No individuals of golden sedge were observed in either survey.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

Because of the close association between golden sedge and Cooley's meadowrue, the biological conclusion for golden sedge with DEIS Detailed Study Alternatives M2+O and M1+R is "May Affect, Likely to Adversely Affect" as a result of potential indirect effects associated with the construction of the Hampstead Bypass portion of these alternatives. These indirect effects may include changes in habitat conditions that would negatively impact golden sedge, such as hydrologic changes, isolating small populations by roads, or the introduction of invasive species along the roadway. Direct impacts from these alternatives to golden sedge are not anticipated. The other DEIS detailed study alternatives and the preferred alternative would have no effect on golden sedge.

Informal consultation for golden sedge has taken place between NCDOT and USFWS since July 2010. NCDOT will continue to coordinate with USFWS regarding the potential effects of the proposed project on golden sedge; however, because the preferred alternative will have no effect on golden sedge, formal consultation with USFWS for this species is not necessary.

### **Rough-leaved loosestrife**

Biological Conclusion: May Affect, Likely to Adversely Affect

Suitable habitat for rough-leaved loosestrife, consisting of ecotones or edges between longleaf pine uplands and pond pine pocosins, roadside depressions, maintained power and utility line rights-of-way, firebreaks, and trails, exists within the study area. Surveys for rough-leaved loosestrife were conducted June 2-4, 2009. No individuals of rough-leaved loosestrife were observed. Suitable habitat for rough-leaved loosestrife within additional study areas was surveyed by biologists on June 16-17, 2010. No individuals were observed. Additional surveys were conducted by biologists on May 29-30, 2012 in areas of suitable habitat for rough-leaved loosestrife within the corridor for the preferred alternative. Updated surveys were conducted by biologists on June 4-5, 2014 in areas of suitable habitat for rough-leaved loosestrife within the corridor for the preferred alternative.

A review of NCNHP data, updated January 8, 2014, indicates three extant occurrences and one historic occurrence within one mile of the study area in New Hanover County and two extant populations within one mile of the study area in Pender County. The two Pender County populations are located on Holly Shelter Game Land, while the three extant populations in New Hanover County are located within the boundaries of NCDOT's Corbett Tract Mitigation Site. Moreover, as of November 2009, two additional occurrences of rough-leaved loosestrife located within a section of NCDOT's mitigation site known as the Plantation Road Mitigation Site were removed from the NCNHP dataset. Prior to their removal, these two occurrences were listed as extant populations, having last been observed in June 2000. At the request of USFWS, biologists visited these two locations on June 16-17 and June 23, 2010. Multiple stems of rough-leaved loosestrife were found in the vicinity of both element occurrences. One population is located within the study corridors of Alternatives M2, O, and U at M2. The second population is located within the study corridor paralleling the US 17 Wilmington Bypass between Alternatives M1 and M2. Though surveys were conducted during the appropriate survey window, no stems at either location were found in bloom. A review of NCNHP data, updated January 2014, indicates three populations of rough-leaved loosestrife within one mile of the study area. One of these populations is located within the Plantation Road Mitigation Site and also within the corridor for the preferred alternative. Preliminary design right-of-way limits for the preferred alternative avoid direct impact to the plant population, but do impact a small segment of the Plantation Road Mitigation Site. In addition, a review of updated January 2014 NCNHP data indicates one occurrence of rough-leaved loosestrife within one mile of the extended study areas for the potential service roads (SR3, SR8, and SR16) and the Lendire Road improvements. The rough-leaved loosestrife populations within NCDOT's Corbett Tract Mitigation Site are within one mile of the extended study area for SR3; however, SR3 was dropped from further consideration in the SDEIS, so project activities within the limits of the extended study areas will have no effect on this species.

As a result of potential direct and indirect impacts to rough-leaved loosestrife, the biological conclusion for the DEIS detailed study alternatives and the preferred alternative is "May Affect, Likely to Adversely Affect." Direct impacts to occurrences of rough-leaved loosestrife at the Plantation Road Mitigation Site would occur as a result of clearing associated with the construction of Alternatives M2, O, or U at M2. In addition,



indirect effects from all of the DEIS detailed study alternatives and the preferred alternative may occur as a result of potential hydrologic changes at the Plantation Road Mitigation Site resulting from project construction.

Based on the biological conclusion for the preferred alternative, formal consultation with USFWS regarding the potential effects on the federally-protected rough-leaved loosestrife is required. Informal consultation for the potential effects of the proposed project on rough-leaved loosestrife has taken place between NCDOT and USFWS since 2008. NCDOT will continue to coordinate with USFWS regarding the potential effects of the preferred alternative on rough-leaved loosestrife. USACE will serve as the lead federal agency with respect to compliance with Section 7 of the ESA.

### **Seabeach amaranth**

Biological Conclusion: No Effect

Suitable habitat for seabeach amaranth, consisting of barrier island beaches, does not exist within the study area.

A review of NCNHP data, updated January 8, 2014, indicates no occurrences within one mile of the study area.

USFWS proposals for listing of the red knot (*Calidris canutus rufa*) and the Northern long-eared bat (*Myotis septentrionalis*) as Threatened and/or Endangered species were published in the Federal Register in September 2013 and October 2013, respectively. The listings may become effective as soon as October 2014. These species are not included in USFWS's current list of protected species for New Hanover and Pender Counties. NCDOT is working closely with USFWS to understand how these proposed listings may impact NCDOT projects. NCDOT will continue to coordinate appropriately with USFWS to determine if this project will incur potential effects to the red knot and Northern long-eared bat, and how to address these potential effects, if necessary.

#### **4.5.4.4 BALD EAGLE AND GOLDEN EAGLE PROTECTION ACT**

As discussed in Section 3.5.4.4, potential foraging habitat for bald eagle exists within the study area near wetland GWA, and two independent sightings of an adult bald eagle were observed in this area in 2008. Wetland GWA is located within the study corridors for US 17 Hampstead Bypass Alternatives O and R. Forested areas surrounding wetland GWA are primarily immature and lack large, dominant trees. No eagle nests were observed by biologists within the study area or within 660 feet of the study area during field investigations. A review of NCNHP data, updated January 2014, indicates no occurrence of bald eagle within one mile of the study area. The proposed project is not expected to impact bald eagle.

#### **4.5.4.5 ESSENTIAL FISH HABITAT IMPACTS**

As discussed in Section 3.5.4.5, there is no designated Essential Fish Habitat (EFH) present within the study area.

#### **4.5.4.6 AREAS OF ENVIRONMENTAL CONCERN IMPACTS**

As discussed in Section 3.5.4.6, there are no CAMA Areas of Environmental Concern (AEC) present within the study area. As discussed in Section 4.2.1, the proposed project is compatible with the New Hanover County and Pender County land use plans. The project meets the consistency requirement of the Coastal Area Management Act (CAMA). During the Section 404 Permit application process, NCDOT will request a Consistency Certification from NCDOT that the proposed project complies with the enforceable policies of the NC Coastal Management Program.

#### **4.5.4.7 ANADROMOUS FISH HABITAT IMPACTS**

As discussed in Section 3.5.4.7, there is no anadromous fish habitat present within the study area.

As noted in Section 3.5.4.7, Harrison's Creek and Island Creek are designated as inland waters under the jurisdiction of the North Carolina Wildlife Resources Commission (NCWRC). Coordination with NCWRC concluded that no in-water construction moratoria are necessary for these streams.

#### **4.5.4.8 SUBMERGED AQUATIC VEGETATION IMPACTS**

As discussed in Section 3.5.4.8, there is no submerged aquatic vegetation present within the study area.

### **4.6 INDIRECT AND CUMULATIVE EFFECTS**

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Section 4.6 of the 2011 DEIS provided an analysis of the potential indirect and cumulative effects as a result of the proposed project. Subsequent to the release of the DEIS, an updated Indirect and Cumulative Effects (ICE) Analysis, including an *Indirect and Cumulative Effects Screening Report and Land Use Scenario Assessment* (September 2013), was completed for the proposed project. Information from the updated ICE analysis is incorporated below.

Proposed changes to the project as documented in the Supplemental DEIS are consistent with the conclusions regarding indirect and cumulative effects as presented in Section 4.6 of the DEIS. Additional changes to the proposed project since the release of the SDEIS, including the ten proposed service roads and the proposed Lendire Road improvements, also are consistent with the conclusions regarding indirect and cumulative effects as presented in the updated ICE analysis and Section 4.6 of the DEIS.

As discussed in Section 2.8.5, the purpose of the ten proposed service roads is only to restore existing access to properties that would lose access as a result of construction of the proposed project. Because the properties currently have access, the service roads are not expected to induce land use changes compared to the no-build alternative.

As discussed in Section 2.8.6, the purpose of the proposed Lendire Road improvements is to improve traffic operations along the Market Street corridor by eliminating the existing unsignalized T-intersection at Lendire Road and Market Street. The realignment of Lendire Road involves construction of a relatively short stretch of new road to connect the existing stubbed-out section of Middle Sound Loop Road to existing Lendire Road (see Figure 21). Because the study area for the Lendire Road improvements is located in a heavily developed area along the Market Street corridor, the entire area is classified as maintained/disturbed. All remaining developable lots in the vicinity of the proposed improvements have existing access, so the proposed improvements would not provide new access that would encourage additional development.

The North Carolina Department of Environment and Natural Resources, in 15A NCAC 1C.0101 Conformity with North Carolina Environmental Policy Act, Statement of Purpose, Policy and Scope, defines “Cumulative Effects” as those effects resulting “from the incremental impact of the proposed activity when added to other past, present, and reasonably foreseeable future activities regardless of what entities undertake such other activities.” Cumulative effects can result when activities taking place over time are collectively significant, even when individually those activities are minor. The Code defines “Indirect Effects” as those effects “caused by and resulting from the proposed activity although they are later in time or further removed in distance, but they are still reasonably foreseeable.”

Several factors are taken into consideration when evaluating the potential for indirect and cumulative impacts, and to determine if further analysis is warranted. Examples may include whether a project conflicts with local planning, whether it serves economic and/or specific development purposes, if the project could stimulate complementary development, and how the project could affect natural features.

Both Military Cutoff Road Extension and the Hampstead Bypass are included in local transportation planning documents. Conflicts with the plans are not anticipated. The project is not associated with an explicit economic development purpose nor is it intended to serve a specific development.

Complementary development such as highway-oriented uses is not expected to be associated with either Military Cutoff Road Extension alternative. It is anticipated development would follow current nearby uses and zoning, which is mostly residential. Complementary development such as highway-oriented uses could be expected for Hampstead Bypass alternatives around the proposed NC 210 interchange and, though less likely, the northern interchanges. Rural residential uses may transition to higher density residential development in the vicinity of the NC 210 interchange as well.

The Wilmington area in general is likely to continue to be a regional draw for development. Military Cutoff Road Extension would provide new access to undeveloped parcels allowing them to follow surrounding trends and develop as residential properties. The Hampstead Bypass would make conditions more favorable for commuters coming to the Wilmington area and coastal communities from the north. More favorable commuting conditions combined with a desirable location near Wilmington could have some influence on intraregional land development location decisions, but local planners did not expect there would be a significant change as a direct result of the project.

#### 4.6.1 EVALUATION OF INDIRECT EFFECTS

The evaluation of certain indicators helps to determine the potential for land use change induced by transportation projects. These factors include scope of project, change in accessibility, forecasted population and employment growth, available land, water and sewer availability, market for development, local public policy, and notable environmental features. The relative ratings of these factors determine whether or not a Land Use Scenario Assessment needs to be completed. The Indirect Land Use Effects Screening Tool is shown in Table 4-21 and summarized below.

Table 4-21. Indirect Land Use Effects Screening Tool – Military Cutoff Road Extension/ US 17 Hampstead Bypass

Rating	Scope of Project	Change in Accessibility	Forecasted Population Growth	Forecasted Employment Growth	Available Land	Water/ Sewer Availability	Market for Development	Public Policy	Notable Environmental Features	Result
<b>More Concern</b>	Major New Location	> 10 minute travel time savings	> 3% annual population growth	Substantial # of New Jobs Expected	5000+ Acres of Land	All services existing / available	Development activity abundant	Less stringent; no growth management	Targeted or Threatened Resource	
↑	X	X			X					
↑			X				X			Likely Indirect Scenario Assessment
↔						X				
↓				X				X	X	
↓										
<b>Less Concern</b>	Very Limited Scope	No travel time savings	No population growth or decline	No new Jobs or Job Losses	Limited Land Available	No service available now or in future	Development activity lacking	More stringent; growth management	Features incorporated in local protection	

Access to the fully controlled Hampstead Bypass (R-3300) will be provided only at interchanges. As stated previously, the ten proposed service roads for both projects will

restore existing access to properties that would lose access as a result of construction of the proposed project. Limited new access to local roads will be provided along the Military Cutoff Road Extension at Lendire Road, Putnam Drive, and Torchwood Boulevard. Substantial travel time savings (more than ten minutes) are expected for travelers who use the US 17 Hampstead Bypass because they will have a through route without the traffic signals and congestion characteristic of existing US 17. Although not as substantial as the US 17 Hampstead Bypass, Military Cutoff Road Extension will offer travel time savings as an alternative to existing US 17 and a connection to the US 17 Hampstead Bypass.

Population growth in the project area has been increasing at a rate that outpaced New Hanover and Pender Counties since 1990. This trend is expected to continue through 2030, though the rate of growth is expected to decline. The proposed project is not expected to alter growth beyond what is being projected and planned for by the municipalities.

A substantial amount of land (over 35,000 acres) is available for development in the future land use study area. The number and scope of planned and recent developments indicate that development will continue.

Water and wastewater services in Wilmington and New Hanover County are provided by the CFPWA. Sewer lines and water lines extend along Market Street, US 17, Sidbury Road, and Military Cutoff Road. Pender County Utilities provides water and wastewater services in Pender County. Existing sewer and water lines are present along US 17, NC 210, and Hoover Road. The availability of sewer service is the primary limiting factor to development, particularly in Pender County. The expansion of services is planned but funding availability makes the timing of improvements uncertain. Improvements are expected by horizon year 2035. Development is expected to continue independent of the proposed project. However, the proposed project could allow this development to occur sooner, or more intensely, in areas where new access is provided. Since the proposed project is primarily full controlled access, substantial development as a result of the project is not expected between the interchanges.

Local growth control policies are in place to direct growth and protect sensitive environmental resources in the project area. Areas where growth could occur as a result of the proposed project and the associated service roads are generally already planned for in future land use plans. In addition, because the properties served by the service roads currently have access, restoring access that would be lost if not for the service roads is not expected to induce land use changes compared to the no-build alternative.

Overall, based on the indirect land use effects screening tool shown in Table 4-21, there is a moderately high level of concern for indirect effects potential. A Land Use Scenario Assessment was prepared and is discussed in the following section.

Indirect and cumulative effects on water quality have been evaluated based on the watershed in which actions have occurred or will likely occur. There are eight

watersheds in the study area (see Figure 27). Table 4-22 provides baseline information for each watershed.

Table 4-22. Baseline Watershed Data by Hydrologic Unit Code (HUC)

Watershed (HUC)	Wetlands in HUC (acres)/ Percent of HUC that is in Wetlands	Streams in HUC (linear miles)	Wetlands Permitted by USACE in HUC (acres) <sup>1</sup>	Streams Permitted by USACE in HUC (linear feet)/ [linear miles] <sup>1</sup>	Alternatives Located within HUC
030203020401	4,040/38%	102	0.4	0/[0]	U
030203020402	3,310/41%	54	8.6	90/[0.02]	E-H, O, R, U
030203020403	8,160/38%	268	8.7	506/[0.1]	E-H, O, R, U
030203020502	11,658/36%	319	3.8	3,940/[0.75]	E-H, O, R, U, M1, M2
030300070803	9,909/77%	146	1.3	0/[0]	E-H, O, R, U
030300070804	15,701/67%	174	0.6	25/[0.005]	E-H, O, R, U
030300070805	14,054/58%	133	0.2	0/[0]	E-H, O, R, U, M1, M2
030300070808	7,134/34%	61	82.8	2,287/[0.43]	E-H, O, R, U, M1, M2
<b>Total</b>	73,966/48%	1,257	106.4	6,848 linear feet/ [1.3 linear miles]	

<sup>1</sup>Permitted wetland and stream data provided by USACE, Wilmington District. Data set is for the period 2006 through June 2011.

Project-related growth could result in negative indirect effects to water quality and the natural environment. These effects could include a decline in water quality, an increase in the amount and rate of stormwater runoff, and loss of wildlife habitat. The 030300070804 watershed would likely experience higher indirect effects, as a result of potential development around the proposed NC 210 interchange. However, this area is expected to continue to build out regardless of the proposed Military Cutoff Road Extension and Hampstead Bypass projects. Local and state planning regulations and controls can be used to temper these potential effects. Steps have also been taken during project planning to avoid and minimize water quality impacts by developing alignments, in coordination with the NEPA/Section 404 merger team, that minimize impacts to wetlands and streams, as well as developing avoidance and minimization measures for the preferred alternative. NCDOT is investigating potential on-site stream and wetland mitigation opportunities. On-site mitigation will be used as much as possible. Offsite mitigation needed to satisfy the federal Clean Water Act requirements for this project will be provided by the North Carolina Department of Environment and Natural Resources Ecosystem Enhancement Program in accordance with the “North Carolina

Department of Environment and Natural Resources' Ecosystem Enhancement Program In-Lieu Fee Instrument", dated July 28, 2010.

Prescribed burning is a land management tool that could be used at the Plantation Road and Corbett Tract managed areas, which are located adjacent to the US 17 Wilmington Bypass in New Hanover County. Historically, the use of this type of land management for these sites has been limited due to concerns associated with the deep peat soils and reemerging fires. The proximity of the proposed Military Cutoff Road Extension and US 17 Hampstead Bypass interchange at US 17 Wilmington Bypass could make it less likely prescribed burning would be used to manage vegetation on these sites. Prescribed burning is used to manage Holly Shelter Game Lands. Travel lanes on the segment of US 17 directly adjacent to the game lands will be shifted to the east away from Holly Shelter property. However, the proximity of US 17 Hampstead Bypass, including the northernmost interchange, will need to be considered when determining if conditions for prescribed burning on the game lands are appropriate.

Indirect effects, in the form of changes in land use, will be mitigated by existing development regulations such as ordinances that limit development in floodplains and require riparian buffers along streams. The project is located in a rapidly growing area where growth is anticipated and being planned for by local governments. The proposed project is included in, and in accordance with, local plans.

#### **4.6.2 LAND USE SCENARIO ASSESSMENT**

Four Probable Development Areas (PDAs) were identified in the study area to further assess development pressures and future land use. No-Build and Build Scenarios for development without and with the proposed project were developed and used in this evaluation. The categories listed on the Indirect Scenario Assessment Tool (Table 4-23) have been shown to have a direct relationship between indirect development and impacts to resources. These categories include: pressure/demand for typically higher impact development, future shift of regional population growth, pressure for land development outside of regulated or planned areas, development patterns, and planned/managed land use and impacts. Each of these characteristics is assessed for the Build and No-Build scenarios. The results help determine the overall impact potential on development patterns and resources from the proposed project. In general, the more the Build and No-Build scenarios diverge, the greater the potential for resource impacts.

Table 4-23. Indirect Scenario Assessment Tool – Military Cutoff Road Extension/  
Hampstead Bypass

Rating	Pressure / Demand for Typically Higher Impact Development	Future Shift of Regional Population Growth to the Growth Area	Pressure for Land Development Outside Regulated Areas	Pressure for Land Development Outside Planned Areas	Development Pattern	Planned / Managed Landuse and Impacts
More Concern	Commercial / Industrial Development with Large Parking Lots Likely	Strong Attraction of Development in this Area	A Large Number of Acres in the Probable Development Areas are Outside a Regulated Area	A Large Number of Acres in the Probable Development Areas are Outside a Planned Area	Strip or Sprawling Development Likely	Land Development and Storm Water Management Goals Not Set
↑						
↑	<i>Build Scenario</i>					
↔	<i>No-Build Scenario</i>	<i>Build Scenario</i> <i>No Build Scenario</i>			<i>No-Build Scenario</i>	
↓					<i>Build Scenario</i>	
↓			<i>Build Scenario</i> <i>No Build Scenario</i>	<i>Build Scenario</i> <i>No Build Scenario</i>		<i>Build Scenario</i> <i>No Build Scenario</i>
Less Concern	Commercial Development and / or Large Residential Developments Not Likely	No Population Shift Likely	All Probable Development Areas in a Regulated Area	All Probable Development Areas in a Planned Area	Likely to Support Clustered Development	Development Areas are Consistent with Land Development and Storm Water Management Goals

The study area is largely undeveloped, with the exception of areas near Wilmington and along existing US 17 in Hampstead. However, rapid population growth, numerous completed or under construction developments, and the number of approved development plans suggest that the area will experience substantial development in the future. The primary issue is when this will occur, not if it will occur. The availability of sewer service is key to growth in most of the study area. Some infrastructure improvements have occurred and more are planned as funds become available. It is likely that public-private partnerships will be necessary to fund and implement future sewer service expansion.

Future development is expected to occur regardless of the proposed project and associated service roads. Future land use plans for both counties are supportive of growth and guide where it should be located to have the least impact on sensitive environmental resources and to preserve the rural character in portions of Pender County.

Development that may occur as a result of the project would likely be focused at the NC 210 and northern interchanges of the proposed US 17 Hampstead Bypass, where transportation/land use nodes will be created. There is more available land near the interchange located just west of Grandview Drive. At these locations, there could be a shift from residential to highway-oriented uses. In addition, higher density residential development could occur near these interchanges. Residential development may be encouraged on available land near Torchwood Boulevard, where limited new access would be provided by the proposed Military Cutoff Road Extension.



Because of the area's location, it is already a regional draw for tourists and seasonal residents. Improved access and travel time savings offered by the proposed project could increase the attractiveness of the area to future residents and employers; however, local planners do not expect there to be a significant change. The project has been included in local plans and growth models so growth is not expected to exceed what is being projected and planned for by the municipalities.

Development within all of the PDAs is guided by land use plans, including CAMA land use plans for both counties. In addition, both counties have zoning regulations in place within the PDAs to regulate development. A host of stormwater, land development, and floodplain ordinances also govern development in the PDAs. Therefore, there is minimal concern that the proposed project and associated service roads would encourage development outside of regulated or planned areas. Development that occurs in the PDAs must adhere to strict development and growth control standards.

#### **4.6.3 EVALUATION OF CUMULATIVE EFFECTS**

Cumulative effects to land development, travel times savings, and the natural environment could result when the proposed projects are considered in combination with other proposed transportation projects, past transportation and development projects (most notably the US 17 Wilmington Bypass) and planned development.

Current actions are primarily the proposed projects, which would provide new access, although the proposed service roads would only restore existing access to properties that would lose access as a result of construction of the projects. Past actions mainly include residential development, the widening of Military Cutoff Road, the realignment of US 17 and SR 1561 (Sloop Point Loop Road), the upgrade of intersections along US 17 between the US 17 Wilmington Bypass and SR 1571 (Scotts Hill Loop Road), and the US 17 Wilmington Bypass, which improved east-west access in the corridor. Reasonably foreseeable actions include proposed STIP projects (see Table 3-3) and residential development, primarily in the Pender County portion of the study area.

The proposed projects could have a noteworthy effect on cumulative travel time savings (greater than ten minutes).

Future development could increase the amount of impervious area in the study area, causing an increase in stormwater runoff in streams and wetlands. Increased stormwater runoff could lead to deteriorated water quality and negative impacts to the natural environment. Phase II stormwater regulations and other local ordinances regulating development will minimize adverse effects. No Areas of Environmental Concern were identified in the study area.

There are numerous streams within the area, many of which are crossed by the proposed project. There is potential for direct or indirect impacts to water resources as a result of the proposed project. However, use of best management practices, such as NCDOT's *Best Management Practices for the Protection of Surface Waters* (March 1997), during construction will minimize direct water quality impacts. Direct natural environmental

impacts are addressed programmatically through avoidance, minimization and mitigation actions consistent with agreements with environmental resource and regulatory agencies and will be further evaluated by the NCDOT Natural Environment Unit during project permitting.

There are a number of planned transportation projects in the City of Wilmington that are located outside of the project study area but within the 030300070808 watershed. The cumulative effect of the projects should not result in substantial impacts to the watershed, since much of that area is already highly developed. For Hampstead Bypass Alternatives E-H, O, and R, cumulative effects would likely be higher in the 030300070805, 030203020403, and 030203020402 watersheds as a result of increased impervious surfaces by planned development, the US 17 Wilmington Bypass, and the proposed project. Impacts would likely be higher in the 030203020401, 030203020403, and 030203020402 watersheds for Hampstead Bypass Alternative U, when combined with planned development.

Cumulatively, the construction of Military Cutoff Road Extension and the Hampstead Bypass combined with past NCDOT projects (US 17 Wilmington Bypass) that provide improved east-west regional access, and continued commercial and residential development within the study area, could contribute to cumulative impacts to environmental resources in the study area. Substantial development resulting exclusively from this project and the associated service roads is not expected. Any development that occurs would be implemented in accordance with local ordinances and land use plans. The proposed project is not likely to result in significant changes in land use. Therefore, cumulative effects beyond those discussed above are expected to be low.

## **4.7 CONSTRUCTION IMPACTS**

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Construction of any of the DEIS detailed study alternatives or the preferred alternative is expected to result in similar temporary impacts as described below. Examples of construction activities include clearing and grubbing, maintenance of traffic, bridge construction, utility relocations, traffic signal construction, and roadway paving. Typical types of negative impacts from construction would include noise from construction equipment, driver time delays at existing road crossings, and dust from construction sites.

Since construction operations would be limited to the time needed to complete the project, both benefits and impacts to resources would be considered temporary. Utilization of NCDOT standards and specifications would ensure that these impacts are minimized.

### **4.7.1 ENERGY**

A substantial amount of energy will be required to construct any of the DEIS detailed study alternatives or the preferred alternative. However, the energy use will be temporary and should ultimately result in energy use reductions upon project

completion, due to reduced congestion and increased operational safety within the study area. Because of congestion reductions and increased safety, construction of any of the build alternatives is expected to result in less total energy utilization than the No-Build Alternative.

Executive Orders 13212 and 13302 require federal agencies to take actions to expedite projects which will increase the production, transmission, or conservation of energy, or which strengthen pipeline safety. The subject project is not energy-related, therefore Executive Orders 13212 and 13302 do not apply.

#### **4.7.2 LIGHTING**

Because construction activities could occur 24 hours a day, construction areas could be lit to daylight conditions at night. Night lighting would not be used near residential areas.

#### **4.7.3 VISUAL**

Temporary visual impacts would affect properties adjacent to areas where construction, staging, and stockpiling operations occur. Upon project completion, the contractor would be required to remove all equipment and excess materials, as well as reseed any disturbed areas.

#### **4.7.4 CONSTRUCTION NOISE**

Construction noise varies greatly with the type of equipment in use and the phase of construction activity. Noise levels near a construction project therefore fluctuate greatly from day to day and hour to hour. Construction noise sources include truck and equipment engines, equipment noise from clearing and excavation, back-up alarms, and truck tailgates. Noise generated by construction equipment can reach noise levels of 67 dBA to 98 dBA at a distance of 50 feet. Noise impacts, such as temporary speech interference for passers-by and those individuals living or working near the project, can be expected during construction of any of the DEIS detailed study alternatives or the preferred alternative.

NCDOT specifications require the contractor to limit noise levels to 80 dBA Leq in noise sensitive areas adjacent to the project. NCDOT may also monitor construction noise and require abatement measures where limits are exceeded. NCDOT also can limit work that produces objectionable noise during normal sleeping hours.

#### **4.7.5 AIR**

During construction of the proposed project, all materials resulting from clearing and grubbing, demolition, or other operations will be removed from the project, burned or otherwise disposed of by the contractor. Any burning will be performed in accordance with applicable local laws and ordinances and regulations of the North Carolina State Implementation Plan (SIP) for air quality in compliance with 15 NCAC 2D.0520. Care

will be taken to ensure burning will be performed at the greatest distance practical from dwellings and not when atmospheric conditions are such as to create a hazard to the public. Burning will be performed under constant surveillance. Emissions from construction equipment are regulated.

During construction, measures will be taken to reduce the dust generated by construction when the control of dust is necessary for the protection and comfort of motorists or area residents. Dust control methods may include:

- Minimizing exposed earth surface
- Temporary and permanent seeding and mulching
- Watering of working areas and haul roads during dry periods
- Covering, shielding, or stabilizing material stockpiles
- Using covered haul trucks

#### **4.7.6 UTILITIES**

Construction of the proposed project will require some adjustment, relocation, or modification to existing utilities. Any disruption to utility service during construction will be minimized by close coordination with utility providers and property owners in affected areas, as well as phased adjustments to utilities.

#### **4.7.7 WATER QUALITY AND EROSION CONTROL**

Erosion and sedimentation caused by construction activities could affect drainage patterns and water quality. Erosion and sedimentation during project construction will be controlled through the specification, installation, and maintenance of stringent erosion and sedimentation control methods. In accordance with the North Carolina Sedimentation Pollution Control Act (15A NCAC 4B.001-.0027), an erosion and sedimentation control plan will be prepared for the selected alternative. The plan will follow guidelines established in the NCDENR publication *Erosion and Sediment Control Planning and Design* and NCDOT's *Best Management Practices for Protection of Surface Waters*.

Impacts resulting from erosion and sedimentation will be kept to a minimum by employing Best Management Practices such as re-vegetating or covering disturbed areas and the use of berms, dikes, silt barriers, and catch basins.

NCDOT has *Standard Specifications* that require proper handling and use of construction material. The contractor will be responsible for taking precautions during construction to prevent the pollution of water bodies. These precautions include, but are not limited to the following:

- Pollutants such as chemicals, fuels, lubricants, raw sewage, bitumens, and other harmful wastes shall not be discharged into any body of water.

- Contractors may not ride or drive mechanical equipment across streams unless construction is required in the streambed.
- Excavated materials must be stored and disposed in a way that prevents erosion of the material into surface waters. If material storage in these areas cannot be avoided, Best Management Practices must be implemented to avoid runoff.

Old Topsail Creek and Nixons Creek are designated as Commercial Shellfishing, High Quality Waters (SA; HQW) by NCDWR. Tributaries of these streams (NSA, NSF, NDITCH1, and ZTRIB1) are designated SA; HQW due to the classification of their receiving waters. Howe Creek is designated an Outstanding Resource Water (ORW) by NCDWR. Tributaries of this stream (BDITCH1) are designated ORW due to the classification of their receiving waters. *Design Standards in Sensitive Watersheds* will be implemented for these streams during project construction.

#### **4.7.8 GEODETIC MARKERS**

The proposed project could impact geodetic survey markers. The North Carolina Geodetic Survey will be contacted prior to construction in order to allow resetting of monuments that would be affected. Intentional destruction of a geodetic monument is a violation of North Carolina General Statute 102-4.

#### **4.7.9 BORROW AND DISPOSAL SITES**

Construction of the roadway and bridges may require excavation of unsuitable material and placement of embankments. Specific locations of borrow and disposal sites will be determined by the construction contractor.

Following award of the construction contract, the contractor will be responsible for obtaining all necessary permits resulting from borrow and waste activities that impact Waters of the United States. All construction waste material generated during clearing, grubbing, and other construction phases will be disposed of by the contractor, either on-site in retention areas or off-site, in accordance with state and local regulations. Prior to approval by NCDOT of any proposed borrow source and the removal of any material, the contractor will be required to provide certification from the State Historic Preservation Office that the removal of the borrow material will have no effect on any property eligible for or listed on the National Register of Historic Places. Borrow material from sources in any area under the jurisdiction of USACE and the placement of waste materials in wetlands or streams will not be allowed unless NCDOT has obtained a permit for those activities from USACE.

#### **4.7.10 TRAFFIC MAINTENANCE & DETOUR ACCESSIBILITY**

Detours and road closures may be required in locations where the proposed project uses or crosses existing roadways. Maintenance of traffic and construction sequencing will be planned and scheduled to minimize traffic delays within the project limits. Temporary lane closures and detours may be required at times during construction. A traffic control

plan will be prepared during the final design phase of the project, which will detail impacts to existing traffic patterns, as well as road closures or realignments. The plan will also define detour routes, designated truck routes, and parking areas for construction equipment. Signs will be used where appropriate to provide notice of road closures and other pertinent information to the traveling public. Access to all businesses and residences will be maintained to the extent practical during construction.

#### **4.7.1.1 BRIDGE DEMOLITION**

None of the DEIS detailed study alternatives or the preferred alternative will remove existing bridges. It is not expected that any materials from existing structures will be dropped into Waters of the United States during project construction.

### **4.8 IRRETRIEVABLE & IRREVERSIBLE COMMITMENT OF RESOURCES**

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Implementation of any of the DEIS detailed study alternatives or the preferred alternative would involve a commitment of a range of natural, physical, human, and fiscal resources. Land used for the construction of the proposed project is considered an irreversible commitment during the time period that the land is used for a highway facility. However, if a greater need arises for the use of the land or if the highway facility is no longer needed, the land can be converted to another use. At present, there is no reason to believe such a conversion will be necessary or desirable.

Considerable amounts of fossil fuels, labor, and highway construction materials such as concrete, aggregate, and bituminous material would be expended to build the proposed project. Additionally, large amounts of labor and natural resources would be used in the fabrication and preparation of construction materials. These materials are generally not retrievable. However, they are not in short supply and their use will not have an adverse effect upon continued availability of these resources. Any construction also would require a substantial one-time expenditure of state funds, which are not retrievable.

The commitment of these resources is based on the concept that residents in the immediate area, region, and state will benefit from the improved quality of the transportation system.

### **4.9 RELATIONSHIP BETWEEN LONG-TERM & SHORT-TERM USES/BENEFITS**

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The most disruptive short-term impacts associated with the proposed project would occur during land acquisition and project construction. However, these short-term uses of human, physical, economic, cultural, and natural resources would contribute to the long-term productivity of the study area.

Existing homes and businesses within the selected alternative's right-of-way will be displaced. However, adequate replacement housing, land, and space are available for homeowners and business owners to relocate within the study area.

The project is consistent with the objectives of state and local transportation plans. It is anticipated the proposed project will enhance long-term access and connectivity opportunities in New Hanover County and Pender County, and will support local, regional, and statewide commitments to transportation improvement and economic viability.





## **5.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT**

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Environmental resource and regulatory agency coordination and public involvement are integral to the project development and decision-making process undertaken during the preparation of an Environmental Impact Statement (EIS). The analysis of the full range of alternatives and issues involved in the selection of a preferred alternative requires coordination with the project stakeholders throughout the project development process. This chapter describes the scoping process, agency coordination process, and public involvement activities during preparation of the Draft Environmental Impact Statement (DEIS), Supplemental Draft Environmental Impact Statement (SDEIS) and this Final Environmental Impact Statement (FEIS). It also presents responses to public and agency comments on the DEIS and SDEIS.

### **5.1 AGENCY COORDINATION**

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This project was coordinated with the appropriate federal, state and local agencies. Comments and concerns received throughout the project development process were incorporated into the DEIS and this FEIS, as applicable. Responses to written agency comments received on the DEIS and SDEIS are provided in Section 5.4.1 and 5.4.2.

#### **5.1.1 NEPA/SECTION 404 MERGER PROCESS**

This project has followed the NEPA/Section 404 Merger Process. The Merger Process is an interagency procedure integrating the regulatory requirements of Section 404 of the Clean Water Act into the National Environmental Policy Act and State Environmental Policy Act decision-making process. The agencies represented on the U-4751 and R-3300 NEPA/Section 404 merger team are:

- US Army Corps of Engineers
- US Environmental Protection Agency
- US Fish and Wildlife Service
- National Marine Fisheries Service
- NC Division of Coastal Management
- NC State Historic Preservation Office
- NC Division of Marine Fisheries
- NC Division of Water Resources
- NC Wildlife Resources Commission
- NC Department of Transportation
- Wilmington Metropolitan Planning Organization

Prior to the issuance of the DEIS, the NEPA/Section 404 merger team concurred on the purpose and need, alternatives to be studied in detail, and wetlands and streams to be bridged. Copies of the signature forms from these concurrence meetings are included in Appendix C.

Since the issuance of the July 2011 DEIS and the October 2011 corridor public hearings, the NEPA/Section 404 merger team reached concurrence on NCDOT's preferred alternative (Alternative M1+E-H) as the Least Environmentally Damaging Practicable Alternative (LEDPA), as well as on further avoidance and minimization measures for the project. The following is a summary of the merger team meetings that have taken place since the issuance of the DEIS:

- The NEPA/Section 404 merger team met on December 15, 2011 to review the project status, discuss comments on the DEIS, and to identify any additional information needed prior to their concurrence on the LEDPA.
- The NEPA/Section 404 merger team concurred on NCDOT's recommended preferred alternative, Military Cutoff Road Extension Alternative M1 and US 17 Hampstead Bypass Alternative E-H (see Figure 15), at a meeting on May 17, 2012 in accordance with the procedures detailed in the NEPA/Section 404 Merger Process. USEPA conditionally concurred on Military Cutoff Road Extension Alternative M1 as the LEDPA for U-4751. USEPA abstained from concurrence on US 17 Hampstead Bypass Alternative E-H as the LEDPA for R-3300. Sections 2.7 and 2.9 discuss the merger team's concurrence on the LEDPA in more detail. Copies of the signed LEDPA concurrence form and USEPA's memorandum documenting its position on the LEDPA are included in Appendix C.
- The NEPA/Section 404 merger team met on June 14, 2012 to discuss avoidance and minimization for the proposed Military Cutoff Road Extension. The merger team concurred on avoidance and minimization measures for Military Cutoff Road Extension on September 25, 2012. Avoidance and minimization for Military Cutoff Road Extension was discussed separately from the discussion for US 17 Hampstead Bypass (R-3300) in order to maintain the U-4751 project schedule. Additional time was needed prior to discussing avoidance and minimization measures for US 17 Hampstead Bypass so NCDOT could evaluate the northern interchange design and location in response to comments received from the public at the corridor public hearings. A copy of the signed September 2012 Avoidance and Minimization concurrence form for Military Cutoff Road Extension is included in Appendix C.
- The Avoidance and Minimization meeting for US 17 Hampstead Bypass was held on February 20, 2013. The NEPA/Section 404 merger team concurred on Avoidance and Minimization for US 17 Hampstead Bypass on June 13, 2013, with USEPA abstaining. Copies of the signed June 2013 concurrence form and USEPA's abstention brief for US 17 Hampstead Bypass Avoidance and Minimization are included in Appendix C.

- A NEPA/Section 404 merger informational meeting was held on January 22, 2014 to discuss proposed service road locations for US 17 Hampstead Bypass and Military Cutoff Road Extension (see Section 2.8.5). The merger team also reviewed proposed Lendire Road intersection improvements (see Section 2.8.6). The merger team requested updated Avoidance and Minimization concurrence forms for US 17 Hampstead Bypass and Military Cutoff Road Extension to reflect the changes discussed at the meeting. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension. The revised Avoidance and Minimization concurrence form for Military Cutoff Road Extension was signed on April 23, 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team also agreed upon avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the impacts identified in this FEIS for NCDOT's preferred alternative reflect the incorporation of the agreed upon avoidance and minimization measures for the service roads for both projects.

#### **5.1.2 OTHER AGENCY COORDINATION**

A project scoping letter announcing the start of the proposed Military Cutoff Road Extension (U-4751) and Hampstead Bypass (R-3300) project development, environmental and engineering studies was mailed out to federal, state, and local agencies in August 2005. Comments on the project were requested from the agencies listed below. An asterisk (\*) next to the agency name indicates that a written response was received in response to the scoping letter. Copies of this and other agency correspondence are included in Appendix B.

- US Department of the Army – Corps of Engineers, Wilmington District
- US Environmental Protection Agency
- \* US Department of the Interior – US Fish and Wildlife Service, Raleigh
- National Oceanic and Atmospheric Administration - National Marine Fisheries Service
- Federal Highway Administration
- Federal Emergency Management Agency - National Flood Insurance Program
- \* NC Department of Agriculture
- NC Department of Emergency Management (NCDEM)
- NCDEM – Division of Crime Control and Public Safety
- \* NC Department of Cultural Resources
- \* NC Department of Administration – State Clearinghouse

NC Department of Environment and Natural Resources (NCDENR) – Division of Marine Fisheries

- \* NCDENR – Division of Coastal Management
- NCDENR – Division of Water Quality [Resources]
- NCDENR – Groundwater Section
- NCDENR – Division of Land Resources
- NCDENR – Wildlife Resources Commission
- \* NCDENR – Division of Environmental Health
- NCDENR – NC Division of Air Quality
- NCDENR – Natural Heritage Program
- NC Department of Public Instruction
- Cape Fear Council of Government
- \* New Hanover County
- Pender County
- \* City of Wilmington

A project scoping meeting was held on September 29, 2005 to exchange information about the proposed project. Representatives from NCDOT and the Wilmington Metropolitan Planning Organization attended the meeting.

NCDOT provided a project status update to the Pender County Board of Commissioners at their regular session on August 5, 2013 at the Public Assembly Room in Burgaw. NCDOT representatives discussed the additional northern interchange added to the proposed Hampstead Bypass in response to public concerns regarding access and the current project schedule. The County Commissioners asked questions regarding how the project will affect the schools and local traffic.

NCDOT provided a second project status update to the Pender County Board of Commissioners at their regular session on April 7, 2014 at Topsail High School in Hampstead. The “Citizens for the Hampstead Bypass” concerned citizens group also spoke at the meeting against the proposed interchange near Grandview Drive. This group questioned the accuracy of NCDOT traffic projections for the project and prepared their own forecast. NCDOT representatives discussed the methodology used in development of the Department’s traffic forecast for the proposed project. NCDOT staff further explained the Department’s forecast is based on the Wilmington MPO’s Travel Demand Model. NCDOT staff also discussed the differences between the methodologies used for the development of the Department’s traffic forecast and the citizens group’s forecast.

NCDOT conducted a meeting on June 5, 2013 at the New Hanover County Emergency Operations Center to discuss protection measures that could be implemented for the Cape Fear Public Utility Wellhead Protection Area associated with the Nano Water Treatment Plant. Representatives from the following agencies participated in the meeting: NCDENR Public Water Supply Section, Cape Fear Public Utilities Authority, New Hanover County Department of Fire Services, New Hanover County Emergency Management/911, Wilmington Fire Regional Response Team, and NCDOT. Additional

protection measures for the wellhead protection area were developed and agreed upon at the meeting. Measures requiring NCDOT participation have been added to the project commitments.

## **5.2 PUBLIC INVOLVEMENT**

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### **5.2.1 CITIZENS INFORMATIONAL WORKSHOPS**

#### **5.2.1.1 APRIL 23 AND 24, 2007 WORKSHOPS**

Citizens informational workshops were held on April 23, 2007 in Hampstead and on April 24, 2007 in Wilmington. Citizens received notification through the mail about the workshops and also through local media advertisement. The purpose of the workshops was to introduce citizens to the project and receive their comments and concerns.

A total of 174 participants signed in at the workshops. The majority of comments and questions related to project alternatives and the effects of the proposed project on individual properties. Several meeting participants recommended a project website. Concerns were voiced about potential property value and environmental impacts. Eighty-seven comment sheets were completed at the workshops. Thirty-four citizens indicated their support of the proposed Hampstead Bypass on the comment sheets and six citizens expressed opposition to the bypass. Citizens submitting written comments were generally in favor of the proposed Military Cutoff Road Extension. However, support for Alternative M1 and Alternative M2 was split, with slightly more preferring Alternative M2.

#### **5.2.1.2 AUGUST 15, 2013 WORKSHOP**

NCDOT conducted a citizens informational workshop on August 15, 2013 at Topsail High School in Hampstead. The purpose of the workshop was to present information on the US 17 Hampstead Bypass interchange located north of the Topsail Schools complex, discuss any concerns and answer questions on the proposed improvements, and receive public input. Citizens were informed a Supplemental Draft Environmental Impact Statement addressing the proposed design changes would be available for review in the fall of 2013.

One hundred eighty-three citizens registered their attendance at the workshop. Many of the comments and questions from citizens at the workshop were related to project effects on individual properties and questions related to property access following construction of the bypass. A number of the initial comments made by citizens entering the workshop were in opposition to the interchange west of Grandview Drive. However, some workshop attendees seemed to be more supportive of the proposed project as presented once they had an opportunity to discuss the details of, and reasons for, the proposed design changes. Written comments received from citizens included:

- Support for the US 17 Hampstead Bypass, but not with the interchange west of Grandview Drive.
- Support for the northern interchange north of the Topsail Schools complex.
- Support for and opposition to an interchange at Hoover Road.
- Concerns about impacts on individual properties.
- Concerns about the accuracy of the traffic forecasts.
- Belief the interchange west of Grandview Drive is an unnecessary expense.

### **5.2.2 SMALL GROUP MEETINGS**

A small group meeting was held August 19, 2009 with the Greater Hampstead Homeowners Association to discuss the project and its status.

NCDOT, USACE, and the State Historic Preservation Office held a meeting with the minister and members of the Mount Ararat AME Church on May 3, 2014 to discuss the proposed project's impacts on the church property and cemetery adjacent to Market Street. NCDOT representatives explained that approximately 20 to 30 graves in this cemetery would be relocated with the preferred alternative for Military Cutoff Road Extension. The church members in attendance indicated they would prefer to move the graves to a place within the church's cemeteries rather than moving the graves to another site. However, it will be left up to the next of kin for each relocated grave to decide where the grave will be moved. NCDOT representatives also explained that the costs of relocating the graves will be paid for by the State. If the cemeteries cannot hold any more graves, the State will pay for moving the graves to another site. NCDOT representatives also explained that they will locate all of the graves in the cemetery, starting with those near Market Street, in order to get a more accurate count of grave impacts.

### **5.2.3 PUBLIC HEARINGS**

#### **5.2.3.1 OCTOBER 17 AND 18, 2011 CORRIDOR PUBLIC HEARINGS**

NCDOT conducted two corridor public hearings for the proposed project following distribution of the July 2011 DEIS and the issuance of a Public Notice by the US Army Corps of Engineers (USACE):

- Monday, October 17, 2011 at Noble Middle School in Wilmington. 118 citizens registered their attendance at the meeting.
- Tuesday, October 18, 2011 at Topsail High School in Hampstead. 266 citizens registered their attendance at the meeting.

The purpose of the corridor public hearings was to obtain public input on the alternative corridors being considered for the project.

A total of 384 citizens registered their attendance at the public hearings. Fifteen individuals provided verbal comments and 92 written comments were received. Several of the comments were related to potential project effects on individual properties, especially along proposed Military Cutoff Road Extension. Several other written comments were related to environmental concerns. Some of these expressed concerns the proposed projects would be detrimental to the environment, while others expressed the opinion environmental concerns were affecting project design to the detriment of the community. Seventy of the written comments submitted pertained to the US 17 Hampstead Bypass. Most of those comments were related to the location of the northernmost interchange for the bypass. Virtually all of these expressed concern that no access north of the schools was proposed.

NCDOT conducted a post-hearing meeting on December 1, 2011 to review and discuss all verbal and written comments received on the proposed design during the public comment period. Based on the public's concern related to the lack of direct access to existing US 17 from the Hampstead Bypass at the northern end of the project, the project team considered additional northern interchange options for the proposed bypass, as discussed in Section 2.8.1. Also in response to comments received from the public, the southeast quadrant of the Military Cutoff Road Extension and Market Street interchange was realigned to the west to avoid impacts to a residential area.

#### **5.2.3.2 AUGUST 28, 2012 DESIGN PUBLIC MEETING FOR MILITARY CUTOFF ROAD EXTENSION**

A design public meeting was held for Military Cutoff Road Extension on August 28, 2012 in Wilmington to present the proposed preliminary design within NCDOT's preferred alternative corridor. A total of 222 citizens registered their attendance at the meeting.

Ten individuals recorded verbal comments for the record at the public meeting. Sixteen people submitted written comments at the meeting or during the comment period following the meeting. In their comments, citizens expressed concerns about increased traffic noise, decreased property values, emergency vehicle access, access to businesses on Market Street, and increased traffic on local roads. Other concerns included the lack of signals at crossovers and U-turns, the lack of access to Murrayville Road from Military Cutoff Road Extension, and potential drainage issues.

NCDOT conducted a post-hearing meeting on November 5, 2012 to review and discuss all verbal and written comments received on the proposed design during the public comment period. In response to comments received on the proposed project, NCDOT revised the Military Cutoff Road Extension preliminary design to provide a T-turnaround on Brookbend Drive and retain the existing median configuration on Military Cutoff Road at Paradise Way and Harris Teeter. NCDOT has and will continue to coordinate with emergency service providers regarding emergency vehicle access in the project area. As a result of discussions with emergency services and the City of Wilmington, Cape Harbor Drive secondary access at Market Street was maintained with a service road. In addition,

where feasible, the preliminary design was revised in order to maintain access to several businesses in the area.

### **5.2.3.3 FUTURE DESIGN PUBLIC HEARING FOR US 17 HAMPSTEAD BYPASS**

A design public hearing will be held for the US 17 Hampstead Bypass following approval of this FEIS and publication of the State Record of Decision (SROD). The purpose of the meeting is to present the proposed design within the Selected Alternative corridor to the public prior to completion of final design plans and right-of-way acquisition. A newsletter announcing the design public hearing will be mailed to individuals on the project mailing list.

### **5.2.4 ADDITIONAL PUBLIC INVOLVEMENT**

#### **5.2.4.1 NEWSLETTERS**

Five newsletters were mailed to citizens and other stakeholders within the study area:

- Newsletter 1 (April 2007): Announced the first set of citizens informational workshops and provided general project information.
- Newsletter 2 (September 2008): Announced the alternatives selected for detailed study and provided a project status update and a summary of the April 2007 citizens informational workshops.
- Newsletter 3 (September 2010): Provided a project update, including information on the detailed study alternatives and project schedule.
- Newsletter 4 (August 2012): Announced the selection of NCDOT's preferred alternative and the Design Public Meeting scheduled for the proposed Military Cutoff Road Extension in August 2012.
- Newsletter 5 (October 2013): Announced the availability of the SDEIS for public review and comment. It also included a summary of the public comments received at the August 2013 Citizens Informational Workshop, as well as an overview of the reasons an additional interchange was added to the northern end of the US 17 Hampstead Bypass.

#### **5.2.4.2 TOLL-FREE PROJECT INFORMATION LINE AND PROJECT WEBSITE**

A toll-free project information line was established in 2007 to receive project comments and questions. A project website ([www.ncdot.org/projects/US17HampsteadBypass](http://www.ncdot.org/projects/US17HampsteadBypass)) was developed in 2008 to make project mapping, newsletters, and other project information available to the public. Key project documents, including this FEIS, the DEIS, the SDEIS, the October 2011 Corridor Public Hearing Maps, and the August 2012 Design Public Meeting Maps for the proposed Military Cutoff Road Extension, are posted on the project website for citizens to obtain and review. In addition, the website



provides contact information for project representatives, including the telephone number for the toll-free information line. The website link was provided in project newsletters and handouts.

#### **5.2.4.3 ADDITIONAL PUBLIC OUTREACH**

A public notice was issued in September 2011 announcing the availability of the DEIS and the locations where it was available for review. An announcement of the release of the DEIS and its availability for public comment was also published in the Federal Register on September 23, 2011. Responses to citizen and agency comments received on the DEIS are included in Section 5.4 of this FEIS.

A public notice was issued in October 2013 announcing the availability of the SDEIS and the locations where it was available for review. An announcement of the release of the SDEIS and its availability for public comment was also published in the Federal Register on October 31, 2013. A post card announcing the availability of the SDEIS was mailed to individuals on the project mailing list. Responses to agency comments received on the SDEIS are included in Section 5.4 of this FEIS.

A public notice will be issued announcing the availability of this FEIS and the locations where it can be reviewed. Responses to comments received on the FEIS will be included in the State Record of Decision (SROD). The SROD is expected to be completed in the summer of 2014.

### **5.3 USACE PUBLIC INTEREST REVIEW**

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The proposed project will be reviewed in accordance with 33 CFR 320-332, the Regulatory Programs of USACE, and other pertinent laws, regulations, and executive orders. The decision whether to authorize this proposal will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed action on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors, which may be relevant to the proposal, will be considered. Among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs and, in general, the needs and welfare of the people.

All public interest factors have been reviewed. The following public interest factors included in Sections 5.3.1 through 5.3.20 below are considered relevant to this proposal. Both cumulative and secondary impacts on the public interest were considered.

### **5.3.1 CONSERVATION**

As described in Section 3.2.1, with the exception of properties near US 17, land use north of the Wilmington Bypass is predominantly rural in nature and includes preserved land, undeveloped forests, open fields, and wetlands. Conservation areas are addressed in Section 3.2.1.3 in relation to the *Wilmington-New Hanover County Joint Coastal Area Management Plan 2006 Update*, the *Pender County CAMA Land Use Plan 2005 Update*, and the *Pender County Comprehensive Land Use Plan*. Section 4.2.1 provides information on compatibility with local land use plans. Indirect and cumulative effects related to development can be found in Section 4.6.

### **5.3.2 ECONOMICS**

In accordance with 33 CFR 320.4(q), Section 4.1.5 describes how new and/or improved access and mobility provided by the proposed project will have an overall positive economic effect. Indirect and cumulative economic effects are described in Section 4.6. The proposed project is not expected to directly contribute to National Economic Development, which is an increase in the net value of the national output of goods and services.

### **5.3.3 AESTHETICS**

The proposed project is on new location, much of it through rural areas. While the new roadway will visually alter the area, the proposed project is compatible with local land use plans and future planned development. Both Military Cutoff Road Extension and the US 17 Hampstead Bypass will result in visual and aesthetic impacts. Views will be diminished from Ogden Park, a recreational setting, by Military Cutoff Road Extension alternatives. The US 17 Hampstead Bypass will result in some replacement of vegetation with asphalt and vertical and horizontal changes in the view of the rural landscape, which will impact travelers using existing roadways and nearby homes and businesses.

The US 17 Hampstead Bypass alternatives will impact the views from a visually sensitive property – the Topsail Schools complex. The back of the Topsail Schools complex includes recreational fields that currently overlook a forested area. Alternative U could also be expected to impact low-income rural residents' views at NC 210 with the introduction of an interchange, which would create horizontal and vertical changes in the landscape. This alternative would also impact residents' views in the area of the Hoover Road crossing.

Section 4.7.1.3 addresses temporary visual impacts associated with project construction.

### **5.3.4 GENERAL ENVIRONMENTAL CONCERNS**

General environmental concerns, including beneficial and detrimental effects have been evaluated in accordance with (33 CFR 320.4(p)). Section 4.1.4 evaluates Environmental Justice. Information pertaining to other environmental factors is addressed in Sections 5.3.5 through 5.3.20 below.

### **5.3.5 WETLANDS**

Wetland impacts have been evaluated in accordance with 33 CFR 320.4(b). Estimated wetland impacts for the proposed project range from approximately 218 acres to approximately 384 acres, depending on the alternative (see Table 4-19). The estimated wetland impacts for NCDOT's preferred alternative are 261.19 acres, including 13.04 acres of impact from the ten proposed service roads (see Table 2-10). No anadromous fish spawning areas, shellfish growing areas, or primary nursery areas will be affected by the project. Additionally, there is no Essential Fish Habitat or Coastal Area Management Act Areas of Environmental Concern within the project study area. Sections 3.3.8.3 and 4.3.8.3 address wetland conservation areas. Sections 3.5.3.2.3, 4.5.3.2.3, and 4.6 provide additional specific information, including indirect and cumulative effects, regarding wetlands within the project study area.

### **5.3.6 HISTORIC AND CULTURAL RESOURCES**

In accordance with 33 CFR 320.4(e), impacts to historic and cultural resources have been evaluated as a part of the project. Sections 3.4 and 4.4 provide information on the resources and impacts.

### **5.3.7 FISH AND WILDLIFE VALUES**

In accordance with 33 CFR 320.4(c), NCDOT has coordinated extensively with USFWS and the NC Wildlife Resources Commission, as detailed in Section 5.1 and Appendix B. Fish and wildlife resources are detailed in Sections 3.5.2 and 4.5.2.

### **5.3.8 FLOOD HAZARDS**

Sections 3.3.7 and 4.3.7 address flood hazard issues. NCDOT has coordinated with local planners to ensure the proposed project is compatible with local plans, including hazard mitigation.

### **5.3.9 FLOODPLAIN VALUES**

As stated in 33 CFR 320.4(l)(1)(i), floodplains are valuable in providing a natural moderation of floods, water quality maintenance, and groundwater recharge. All of the detailed study alternatives cross the 100-year floodplain. In accordance with Executive Order 11988, NCDOT will coordinate the project with the NC Floodplain Mapping Program. Additional information regarding floodplains is located in Sections 3.3.7 and 4.3.7.

### **5.3.10 LAND USE**

Land use information and impacts are detailed in Sections 3.2 and 4.2.

#### **5.3.1.1 NAVIGATION**

At its closest point, the proposed project is approximately 1.5 miles from a channel leading to the Intracoastal Waterway. The project will have no effect on navigation, and no permits from the US Coast Guard are required.

#### **5.3.1.2 SHORE EROSION AND ACCRETION**

The proposed project will have no effect on shore erosion or accretion, as it pertains to 33 CFR 320.4(g)(2).

#### **5.3.1.3 RECREATION**

As stated in the Project Commitments and Section 2.4.2.2.2, the Wilmington MPO has requested the inclusion of a multi-use path as part of the proposed project. The multi-use path would tie into an existing multi-use path along Military Cutoff Road. NCDOT will continue to coordinate with the Wilmington MPO on the inclusion of the multi-use path in the proposed project. It is anticipated pedestrian access to existing multi-use path facilities and Ogden Park would be improved if pedestrian facilities are constructed. The US 17 Hampstead Bypass would not be conducive to pedestrian or bicycle uses, and is not expected to affect pedestrian or bicycle access. Sections 3.1.3 and 4.1.2 discuss recreation in the area. Section 4.2.2.3 provides information related to bicycle and pedestrian impacts.

#### **5.3.1.4 WATER SUPPLY**

In accordance with 33 CFR 320.4(m), impacts to the project area water supply are detailed in Sections 3.5.3 and 4.5.3.

#### **5.3.1.5 WATER QUALITY**

The proposed project will require a Water Quality Certification from the North Carolina Division of Water Resources (NCDWR). During development of the preferred alternative, NCDOT has coordinated extensively with NCDWR and USEPA regarding compliance with the Clean Water Act, in accordance with 33 CFR 320.4(d). Detailed information related to water quality compliance and coordination can be found in Sections 3.5.4, 4.5.3, 4.5.4.1.2, 4.6, and 5.1 and Appendix B.

#### **5.3.1.6 ENERGY NEEDS**

As stated in Section 4.7.1.1, and in accordance with 33 CFR 320.4(n), the proposed project will not increase the production, transmission, or conservation of energy. However, construction of the proposed project is expected to result in less total energy utilization than the No-Build Alternative, due to congestion reductions and increased safety (refer to Section 4.7.1.1).

### **5.3.17 SAFETY**

The proposed project is expected to reduce the potential for accidents along existing roadways, due to a reduction in traffic volumes. Both Military Cutoff Road Extension and US 17 Hampstead Bypass are proposed as median-divided facilities, reducing the likelihood of head-on collisions. Additional safety information is located in Section 2.6.

### **5.3.18 FOOD AND FIBER PRODUCTION**

Estimated prime and unique farmland soils impacts for the proposed project are shown in Table 4-6. The estimated prime and unique farmland soils impacts for NCDOT's preferred alternative are 501 acres. These impacts have been coordinated with the Natural Resources Conservation Service (NRCS). Section 4.3.3 discusses the revised methodology used by NRCS starting in August 2012 to calculate impacts to prime and unique farmland soils. This revised methodology caused the increase in impacts to prime and unique farmland soils with the preferred alternative since completion of the July 2011 DEIS.

Estimated terrestrial community impacts for the proposed project are shown in Table 4-11. The estimated terrestrial community impacts for NCDOT's preferred alternative are 1,006.14 acres. As shown in Table 4-12, it is anticipated that approximately 546.40 acres of this impact would be to forests within the study area. These impacts would result in the removal of forests that could be used as timber lands for future harvesting, so the proposed project could have an impact on fiber production. However, as shown in Table 3-7, there are approximately 4,775.7 acres of forest communities within the study area.

### **5.3.19 MINERAL NEEDS**

The current extent of mining activities within the project area will not be impacted by the proposed project. However, as discussed in Section 4.3.6, NCDOT's preferred alternative could affect future expansions of HanPen mining activities. Additional information related to mineral resources within the project area is located in Sections 3.3.6 and 4.3.6.

### **5.3.20 CONSIDERATIONS OF PROPERTY OWNERSHIP**

Considerations of property ownership have been made during evaluation of the proposed project. Every effort has been made to balance impacts to both the human and natural environments. There will be no impacts to public rights to navigation. Any unavoidable impacts, including to riparian rights, on individual property owners will be handled during the right-of-way acquisition phase of the project. Additional information related to considerations of property ownership can be found in Sections 3.1.3, 3.1.4, and 4.1.1 to 4.1.3.

## 5.4 PUBLIC COMMENTS ON THE SDEIS

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Thirteen citizens submitted written comments on the September 2013 Supplemental Draft Environmental Impact Statement (SDEIS). All of these comments expressed opposition to the proposed Hampstead Bypass interchange near Grandview Drive. These comments are summarized below:

**Comment:** Several commenters stated the belief three interchanges are not needed in the Hampstead area. Several viewed the interchange near Grandview Drive as a waste of taxpayers' money.

**Response:** Three interchanges are proposed in the Hampstead area in response to citizen comments at the October 2011 corridor public hearings for the project. Interchanges for the proposed bypass were proposed at NC 210 and near Grandview Drive at the time of the corridor hearing. However, this design did not provide access to the US 17 Hampstead Bypass for existing US 17 north of the Topsail Schools complex. In their comments at the hearings, the public strongly specified maintaining access on existing US 17 was very important locally.

In response to the public's demand for continued access on existing US 17, a local access interchange was added north of the Topsail Schools complex. The proposed interchange north of the schools uses a reduced design to minimize impacts to red-cockaded woodpecker habitat and the community. This design is more appropriate for a local access interchange carrying a lower volume of traffic. This additional interchange north of the schools will increase the cost and impacts of the project and is only proposed to provide the access requested by the public. The proposed interchange near Grandview Drive could accommodate future traffic volumes without the interchange north of the schools. NCDOT did consider replacing the interchange near Grandview Drive with the interchange north of the schools, but as discussed in Section 2.8.1 of this document, traffic analyses showed existing US 17 in the vicinity of the schools would not operate satisfactorily with only the interchange north of the schools.

**Comment:** Several commenters suggested NCDOT's traffic forecasts are incorrect. One commenter stated a privately funded traffic study showed NCDOT's future traffic volume estimates are "...off by a factor of two..." and that NCDOT never conducted a "community-specific traffic study."

**Response:** In the summer of 2013, in response to questions from a property owner who would be affected by the proposed interchange near Grandview Drive, the NCDOT Transportation Planning Branch reviewed NCDOT's traffic forecast for the project. Their review did not reveal any issues with the forecast, and confirmed it to be reasonable and appropriate. The travel demand model on which the traffic forecast is based considers expected land use and socioeconomic data for the Wilmington and Hampstead area and is therefore "community-specific." This travel demand model is used to develop traffic forecasts for all of the major projects within

the Wilmington Metropolitan Planning Organization area. The use of this model to prepare traffic forecasts for a proposed roadway project uses the best available data and is standard practice in North Carolina.

The privately-funded traffic study mentioned in some of the comments was prepared for a citizen's group. This private traffic study utilized trip generation methods to estimate traffic in the Hampstead area. Trip generation is typically used to estimate the amount of traffic generated by a specific development, not a large regional project like the proposed Hampstead Bypass. The privately-funded study did not consider the proposed Hampstead Bypass as a whole, but only looked at the Hampstead area.

**Comment:** Several commenters expressed concern the proposed interchange at Grandview Drive will increase the potential for accidents in the Hampstead area.

**Response:** The proposed interchange near Grandview Drive is better designed to accommodate the volume of traffic expected to access the bypass in this area than the proposed interchange north of the Topsail Schools complex. As stated previously, the proposed interchange north of the schools uses a reduced design to minimize impacts to red-cockaded woodpecker habitat and the community. This design is more appropriate for a local access interchange carrying a lower volume of traffic. Future peak hour traffic volumes on existing US 17 near the schools would be more than twice as high with only the interchange north of the schools than if both interchanges were provided (see chart in Section 2.8.1.1 of this FEIS). These higher traffic volumes would lead to the signal at the Topsail Schools complex operating at a “failing” level of service and traffic backing up onto the bypass. Retaining the interchange near Grandview Drive will reduce this heavy traffic and congestion in front of the schools, which should improve safety along existing US 17 near the schools.

**Comment:** Several commenters expressed concern regarding the effect of the proposed interchange near Grandview Drive on the Hampstead business district. Several mentioned the greater impacts on the environment, some specifically mentioning Chapel Pond, which is located west of existing US 17 and would be filled in order to build the proposed interchange.

**Response:** NCDOT acknowledges the public's concerns related to community impacts as a result of the proposed interchange west of Grandview Drive. While it is unfortunate, large-scale projects such as the proposed bypass cause impacts to both the human and natural environment. However, NCDOT's project development process, which is based on federal and state laws, is intended to avoid, minimize, and mitigate these impacts to the maximum extent possible. Although it is not possible to avoid all impacts to surrounding areas when designing a freeway facility such as the US 17 Hampstead Bypass and associated interchanges, the two northern interchanges are designed to require as little land as possible while still operating at an acceptable level of service. The proposed design minimizes impacts to natural and

community resources to the maximum extent possible while still serving the purpose and need of the project. In addition, the interchange west of Grandview Drive was part of the previous design for the US 17 Bypass in the Hampstead area and its impacts, including residential and business relocations, were previously presented to the community.

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## **5.5 AGENCY COMMENTS ON THE DEIS AND SDEIS**

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### **5.5.1 AGENCY COMMENTS ON THE DEIS**

#### **5.5.1.1 FEDERAL AGENCIES**

**United States Department of the Interior, Office of the Secretary – November 22, 2011 and United States Department of the Interior, US Fish and Wildlife Service – October 5, 2011**

**Comment:** “The cover page of the DEIS incorrectly states that the Service is a Cooperating Agency. Although the Service has participated in early coordination through the Merger Process for years, the Service was not formally requested to be a Cooperating Agency (as per 40 CFR Section 1501.6), nor has the Service participated in the preparation of the DEIS.”

**Response:** USEPA and USFWS were incorrectly listed on the cover of the DEIS as Cooperating Agencies. The Cooperating Agencies have been removed from the cover of this FEIS.

**Comment:** “Page 2-29 states that a total right of way width of 250 to 350 feet is proposed for Hampstead Bypass Alternatives E-H, O and R, and that a total right of way width of 250 to 520 feet is proposed for Alternative U. This statement appears inconsistent with the ‘Green Sheet’ project commitment ‘Roadway widening improvements associated with Hampstead Bypass along existing US 17 in this area [in the vicinity of Holly Shelter Game Land] will not exceed a width of 200 feet in order to maintain connectivity between red-cockaded woodpecker foraging habitat partitions.’ This commitment also appears on page 4-37. For red-cockaded woodpecker (RCW, *Picoides borealis*) habitat east of US 17 to be counted towards the total habitat acreage within foraging partitions EC and 17, it is imperative that the total cleared area not exceed 200 feet.”

**Response:** There were typographical errors related to the proposed right-of-way widths in Section 2.4.2.3 and on Figure 11A of the DEIS. A variable right-of-way width of 200 to 350 feet was proposed for Detailed Study Alternatives E-H, O, and R, not 250 to 350 feet as stated in the DEIS. A variable right-of-way width of 200 to 520 feet was proposed for Alternative U, not 250 to 520 feet as stated in the DEIS. The DEIS included a commitment to maintaining a maximum right-of-way width of 200 feet in the vicinity of Holly Shelter Game Land, as noted in the “Project Commitments” section and on page 4-37.



Since the completion of the DEIS, it was determined the proposed clearing for the six lanes proposed for the northern section of the proposed bypass, including along the portion of existing US 17 between the bypass tie-in and Sloop Point Loop Road, will exceed 200 feet in some areas. The proposed right-of-way width through RCW Cluster 17 is now 250 feet, and through Cluster EC is now 225 feet. Although the proposed clearing will exceed 200 feet in some areas, based on new proposed regional RCW Standard for Managed Stability (SMS) foraging habitat guidelines that USFWS agreed to use for this project (see Section 4.5.4.3), the December 2012 foraging habitat analysis found that clearing greater than 200 feet along existing US 17 within the foraging partitions would not result in the take of an additional RCW cluster. The commitment to maintain a maximum right-of-way width in the vicinity of Holy Shelter Game Land has been removed from the Project Commitments section in the FEIS.

**Comment:** “Page 3-49 incorrectly states that green sea turtles (*Chelonia mydas*) do not nest in North Carolina. Green sea turtles do sporadically nest in North Carolina in small numbers. Page 3-49 also states ‘Loggerheads occasionally nest on North Carolina beaches...’ Actually, loggerhead sea turtles (*Caretta caretta*) consistently nest in North Carolina.”

**Response:** Nesting information for green sea turtles and loggerhead sea turtles has been corrected in this FEIS.

**Comment:** “Table 4-7 on page 4-17 displays the impacts to certain preservation areas. Especially problematic are the impacts to the Plantation Road Site. This site contains several stems of the federally endangered rough-leaved loosestrife (*Lysimachia asperulaefolia*). Page 3-16 correctly states that the Plantation Road Site was, as per the conservation measures in the January 2002 NCDOT Biological Assessment (BA) and May 22, 2002 Service Biological Opinion (BO) for the I-40 Connector (R-2405A), to be maintained as a preservation area for rough-leaved loosestrife. Alternatives M2+O and M2+U would impact a large portion of the preservation site as well as a significant number of rough-leaved loosestrife stems. The Department opposes these two alternatives. Although the other alternatives would have much smaller impacts to this preservation area and may not directly impact rough-leaved loosestrife stems, the designs should be modified to further avoid or minimize impacts.”

**Response:** As discussed in Section 2.7 of this document, Alternatives M2+O and M2+U were not selected as NCDOT’s preferred alternative partly due to their impacts to the Plantation Road Mitigation Site. The designs for the other DEIS detailed study alternatives would be contained within the existing right-of-way in the area of the Plantation Road Mitigation Site. Impacts to the Plantation Road Mitigation Site from these alternatives were calculated based on slope stake limits plus an additional 25 feet. The impacts reported for Alternatives M1+E-H, M1+R, and M1+U are within the “additional 25 feet”. NCDOT will continue to work to avoid and minimize impacts to the Plantation Road Mitigation Site during the preparation of final hydraulic and roadway design plans for the preferred alternative.

**Comment:** “The Corbett Tract Mitigation Site, as per the aforementioned BA and BO, was, in addition to providing wetland mitigation, to also serve as a preservation site for rough-leaved loosestrife. At the time of the 2002 Section 7 consultation for the I-40 Connector, this site had over 100 stems of rough-leaved loosestrife. Although the M1 alternatives would only have small impacts to this site (0.08 – 0.58 acre), the Department strongly recommends refining the designs to further avoid or minimize these impacts.

Four of the five remaining alternatives would impact the Corbett Tract Residual Strip to some degree (0.27 – 3.55 acres). As per the conservation measures in the aforementioned BA and BO, this area was to be utilized ‘as a buffer between the I-40 Connector and adjacent rough-leaved loosestrife clusters.’ Although rough-leaved loosestrife is not known to occur within this area, impacts should be avoided or minimized in accordance with the intent of the conservation measures within the BA and BO.”

**Response:** As shown in Table 4-9 of this FEIS, avoidance and minimization measures incorporated into the revised preliminary design of NCDOT’s preferred alternative reduced impacts to the Corbett Tract Residual Strip by 0.07 acre. Based on the interchange location and design required to handle the traffic movements, it will be very difficult to further minimize impacts to the Corbett Tract Residual Strip.

Alternatives M1+E-H, M1+R, and M1+U are located within the existing right-of-way in the area of the Corbett Tract Mitigation Site. Impacts to the Corbett Tract Mitigation Site from these alternatives were calculated based on slope stake limits plus an additional 25 feet. Impacts reported for Alternatives M1+E-H, M1+R, and M1+U are within the “additional 25 feet”. As discussed in the “Project Commitments” section of this FEIS, NCDOT will further investigate ways to avoid impacts to the Corbett Tract Mitigation Site during detailed project design. If possible, no right-of-way will be acquired from this site.

**Comment:** “Table 4-17 on page 4-35 lists federally protected species by county. Golden sedge (*Carex lutea*) is now listed in New Hanover County with a record status of probable/potential. American chaffseed (*Schwalbea americana*) is incorrectly listed in New Hanover County. It is actually only listed in Pender County as a historic occurrence.”

**Response:** County information in Section 4.5.4.3 of the DEIS for golden sedge and American chaffseed has been corrected in Section 4.5.4.3 (Table 4-20) of this FEIS.

**Comment:** “Page 4-37 states ‘It is anticipated that the USACE will request of the United States Fish and Wildlife Service (USFWS) that formal consultation for red-cockaded woodpecker be initiated...after the least environmentally damaging practicable alternative for the proposed project has been identified.’ The Department believes it would be prudent to delay formal Section 7 consultation until at least after Concurrence Point 4A (CP4A) in the Merger Process when more refined design information is available. If consultation were to begin prior to CP4A, it is likely that the RCW foraging habitat removal locations and extent would need to be repeatedly revised, thus

necessitating re-initiation of Section 7 consultation. Due to encroaching private development, the habitat for RCWs in the project area and the status of the RCW groups have changed significantly in the last few years and will likely continue to change. As such, the Service strongly recommends that the timing of formal Section 7 consultation be carefully planned so as to avoid multiple re-initiations. It is very possible that biological conclusions may change within the next few years.”

**Response:** As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species (i.e., RCW and rough-leaved loosestrife). USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act.

**Comment:** “Page 4-39 and Table 4-17 state that the biological conclusion for golden sedge (*Carex lutea*) is ‘May Affect, Likely to Adversely Affect’. The Department believes that this remains to be determined. As stated in the DEIS, no specimens of golden sedge have been observed within the project area. Although habitat is present, and the closely associated Cooley’s meadowrue (*Thalictrum cooley*) is present, the Department believes that more surveys are warranted. If additional and appropriately timed surveys do not reveal any specimens of golden sedge, the Department would concur with a ‘no effect’ conclusion for this species.”

**Response:** Note that page 4-39 and Table 4-17 of the DEIS indicate that the biological conclusion for golden sedge is “May Affect, Likely to Adversely Affect” for Alternatives O and R. The biological conclusion in the DEIS for Alternative E-H is “No Effect.” Pedestrian surveys were initially conducted by qualified biologists on May 29-30, 2012, for listed plant species, including golden sedge, in areas of suitable habitat within the corridor for NCDOT’s preferred alternative. Updated pedestrian surveys were conducted by biologists for listed plant species within the corridor for the preferred alternative on June 4-5, 2014. No individuals of golden sedge were observed in either survey. The biological conclusions listed in Section 4.5.4.3 (Table 4-20) of this FEIS reflect the results of the most recent survey. NCDOT coordinated with USFWS on these biological conclusions, including the conclusion of “No Effect” on golden sedge for the preferred alternative.

**Comment:** “Pages 4-38 through 4-41 address the effects to Cooley’s meadowrue (*Thalictrum cooley*) and rough-leaved loosestrife (*Lysimachia asperulaefolia*). Given the disparate degree of effects to these species depending upon the alternative selected, graphics depicting the location of the known locations of these species in relation to the different alternatives would be helpful.”

**Response:** Graphics showing the location of known occurrences of Cooley’s meadowrue and rough-leaved loosestrife were included in the handouts for the Least Environmentally Damaging Practicable Alternative (LEDPA) (Concurrence Point 3) meeting.

**Comment:** “We would like to emphasize the serious and complex issues regarding the effects of this project to RCWs. As the DEIS points out, the RCWs located in the adjacent Holly Shelter Game Land are part of the Coastal North Carolina Primary Core Recovery Population within the Mid-Atlantic Coastal Plain Recovery Unit. The Department has diligently worked with NCDOT to refine the alternative designs to minimize the level of take on RCWs. We acknowledge the efforts put forth by NCDOT to reduce the level of take on this species. Based on current information, it appears that the project will still result in a take of at least one active RCW group. Given the fact that the Coastal North Carolina Primary Core Population is still far from achieving its minimum size required for delisting (350 potential breeding groups), the loss of even one potential breeding group is significant. Additional coordination is needed to resolve this issue.”

**Response:** NCDOT is committed to the protection of RCWs and their habitat. As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species (i.e., RCW and rough-leaved loosestrife). USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act. It is anticipated that USACE will request of USFWS that formal consultation for RCW be initiated in accordance with Section 7 of the Endangered Species Act.

**United States Environmental Protection Agency, Region 4 – November 15, 2011**

**Comment:** “It should be noted that EPA and the U.S. Fish and Wildlife Service are listed on the DEIS cover as Cooperating Agencies. Section 1501.6 of the Council on Environmental Quality (CEQ) regulations should be further explored by the USACE and NCDOT for specific requirements of Cooperating Agencies.”

**Response:** USEPA and USFWS were incorrectly listed on the cover of the DEIS as Cooperating Agencies. The Cooperating Agencies have been removed from the cover of this FEIS.

**Comment:** “EPA has rated the DEIS alternatives E-H+M1, O+M2, R+M1, U+M1 and U+M2 as ‘Environmental Objections’ (E0-2). EPA has rated detailed study alternative (DSA) U as ‘Environmental Concerns (EC-2).’ Those DSAs rated as E0-2 are those alternatives where there is a potential for significant environmental impacts to water supply wells and high quality waters of the U.S. that cannot be addressed without significant project modification or the development of other feasible alternatives. The DEIS fails to address the requirements of the Safe Drinking Water Act and the Clean Water Act with respect to current and future water supplies and the Military Cutoff Road extension impacts (i.e., DSA M1 and M2). The DEIS fails to identify avoidance and minimization measures and compensatory mitigation under Section 404 of the Clean Water Act for significant impacts to high quality waters of the U.S.

The rating of '2' indicates that DEIS information and environmental analysis is not sufficient and that additional information is required. EPA has substantial environmental concerns with respect to wetland and stream impacts and appropriate avoidance and minimization measures and compensatory mitigation. In addition, EPA also has environmental concerns for potential impacts to wetland mitigation and preservation sites, prime farmland impacts, impacts to threatened and endangered species, wildlife habitat fragmentation, and human environment impacts. EPA recommends that all of the technical comments in the attachment be addressed prior to the issuance of a Final EIS (FEIS). Furthermore, all relevant environment impacts that have not been disclosed in this document should be addressed in additional documentation prior to the next Merger decision point.

EPA has rated DSA U as having environmental concerns (EC-2) because it has significant environmental impacts to human and natural resources that have not been fully or accurately addressed in the DEIS and additional information is required. EPA believes that strictly combined with other transportation alternatives such as Transportation System Management (TSM) and Travel Demand Management (TDM), DSA U can possibly help meet the purpose and need. However, additional avoidance and minimization measures would be needed for DSA U to prevent degradation to protected and jurisdictional resources. EPA is requesting a conceptual mitigation plan prior to the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA). EPA will not be able to concur on the Least Environmentally Damaging Practicable Alternative (LEDPA) until the significant environmental issues identified in the attachment are satisfactorily resolved.”

**Response:** USEPA’s above comments were further expanded upon in Attachment A to the letter. NCDOT’s responses to the above comments are included below with the responses to those additional comments.

### **Attachment A** **Purpose and Need for the Proposed Project**

**Comment:** “The DEIS includes an elaboration on the purpose and need on Pages 1-3 and 1-4. The discussion concerning safety is not fully examined. EPA believes that the severity of accidents and potential fatalities within the project study area may increase with a new location highway [sic] speed freeway. While overall ‘minor’ traffic accidents may be expected to decrease along US 17/Market Street with a new multi-lane bypass facility, FHWA and National Safety Council studies have shown that new location, high speed freeways in rural areas can potentially increase the severity of accidents. NCDOT safety studies also indicate that the total crash rate for US 17 between US 17 Wilmington Bypass (I-140) and Sloop Point Loop Road is below the 2005-2007 statewide crash rate for rural U.S. routes. Most of the proposed Hampstead Bypass is located substantially north of where the traffic and accident problems are located along existing US 17/Market Street.”

**Response:** Statewide crash rates do not support USEPA's belief "that the severity of accidents and potential fatalities" will increase with a new location freeway. A comparison of statewide crash rates shows that rural freeways (such as the proposed Hampstead Bypass) have lower fatal and injury crash rates than urban facilities with no control of access (such as portions of existing Market Street/existing US 17). The 2007-2009 and the 2009-2011 statewide fatal crash rates for rural US route freeways are almost half the fatal crash rate for urban five-lane US routes with no control of access. The injury crash rate for rural US route freeways is over five times lower than the injury crash rate for urban five-lane US routes.

NCDOT requested copies of the FHWA and National Safety Council studies USEPA cited in the above comment. USEPA provided the following web address: <http://safety.fhwa.dot.gov/speedmgt/>. This website discusses FHWA's Speed Management Team, which was set up to address the problem of speeding on the Nation's highways. The information on this website points to exceeding the posted speed limit as a safety issue, not facilities designed for high-speed traffic.

**Comment:** "This section of the DEIS includes an additional need concerning transportation demand...The DEIS states that with the population increase there is a corresponding growth in tourism and supporting services that resulted in a mixed-purpose traffic on US 17. This section of the DEIS does not specifically identify the correlation between population growth and the growth in tourism and supporting services. The population growth trends presented in Table 1-4 by decade for the periods of 2010-2020 and 2020-2030 are not reflective of more recent socio-economic trends. The large number of annual visitors for tourism does not specifically translate into increased population growth for the project study area. Considering the extensive wetland systems present in the project study area and that most upland areas have already been developed for retirement and seasonal second homes, future trends in permanent population growth are believed to be overestimated to justify new location facilities."

**Response:** The DEIS does not assert there is a correlation between population increase and growth in tourism. Rather, these are two distinct variables which are both causing increased demand on area roadways. The population growth trends were taken from data compiled by the North Carolina Office of State Budget and Management. This data has been updated in Section 1.3.4 of this FEIS using the most current statistics available from the North Carolina Office of State Budget and Management.

Additional data sources were consulted to support the projections obtained from the OBM. The Cape Fear Commutes 2035 Transportation Plan, prepared by the Wilmington Urban Area MPO (December 2010) projects that by 2035, the population of Pender County will more than triple (from its 2008 level) and the population of New Hanover County will grow by approximately 67 percent for the same period. The MPO data is included in this FEIS and the text has been revised for clarity.

**Comment:** “Figure 2 of the DEIS includes the 2008 Levels of Service (LOS) along some of the major routes in the project study area...This figure is confusing as it only provides LOS from A to C, and then breaks out LOS D, E and F.”

**Response:** Figure 3 of the DEIS, not Figure 2, presents 2008 level of service for existing conditions. The designation of levels of service A through C as a single color is intended to simplify the figure, as these levels of service are considered acceptable.

**Comment:** “Twenty-four (24) intersections are also provided with a LOS. EPA notes that a majority of existing Military Cutoff Road within the project study area shown is LOS A-C. Additionally, EPA estimates that based upon peak hour NCDOT traffic estimates, approximately 66,500 feet of 123,375 total feet of existing roadways operate at a satisfactory LOS of A-C. Major sections of the existing multi-lane US 17 highway in Pender County and I-140/Wilmington Bypass show no current traffic capacity issues. Eight (8) of the 24 intersections also operate at LOS A-C.”

**Response:** The project is intended to address capacity issues on Market Street and the US 17 corridor, not existing Military Cutoff Road. It should be noted that the existing Military Cutoff Road/Market Street intersection operated at LOS F in 2008. Also, existing (2008) conditions show that most of Market Street and two-thirds of all intersections analyzed either approach or exceed an acceptable level of service. Figure 5 of the DEIS presents 2035 no-build levels of service. Virtually all of Market Street and existing US 17 within the project limits will be operating at LOS F in the year 2035 without the proposed projects.

**Comment:** “From Figure 2, it can be seen that while the I-140/Wilmington Bypass operates at an acceptable LOS, US 17 from College Road to Futch Creek Road (approximately 7 miles) operates at LOS F. Apparently, I-140/ Wilmington Bypass is not drawing sufficient through traffic from downtown Wilmington roadways. The interchange of I-140/Wilmington Bypass and US 17 north of Porters Neck Road is rated with a LOS A-C. Similarly, the traffic problems (LOS F) south of the proposed extension of Military Cutoff Road would not expect to be improved with a new location, 6-lane freeway connecting to I-140 with a new interchange. EPA is uncertain how the new location, US 17/Hampstead Bypass of approximately 12 to 15 miles will improve traffic carrying capacity south of the proposed connections and new interchange with I-140/Wilmington Bypass. Except for one small area south of Scotts Hill Loop Road and a similarly small area by Topsail High School, US 17 between the I-140 interchange to the northern terminus operates at LOS D or better.”

**Response:** It should be noted that USEPA is citing 2008 levels of service from Figure 3 of the DEIS. Figure 5 of the DEIS (Figure 5 of this document) presents 2035 no-build levels of service for the project area, while Figures 14A through 14D (Figures 14A through 14E of this document) present 2035 levels of service for the project area with construction of the projects. Comparison of these figures shows that the proposed Hampstead Bypass will improve the level of service of portions of

existing US 17. Much of existing Market Street will operate at LOS F, even with proposed Military Cutoff Extension. However, Table 2-7 of the DEIS (Table 2-7 of this document) shows that with the proposed projects, average intersection delay will decrease at almost all of the intersections within the project area. At many intersections, the intersection delay will be less than half of what it would have been without the projects.

**Comment:** “Figure 5 includes the projected 2035 LOS ‘No-build’. Nearly all multi-lane roadways and intersections operate at LOS F based upon projected growth. The DEIS does not include the 2035 LOS in the project study area with the proposed new facilities (Build Scenario).”

**Response:** 2035 level of service within the project study area for the build alternatives is depicted on Figures 14A through 14D of the DEIS and discussed in Section 2.5.3 of the DEIS (Figures 14A through 14E and Section 2.5.3 of this document). In addition, Table 2-7 of the DEIS (Table 2-7 of this document) presents average intersection delay and level of service along existing Market Street and US 17 for the no-build and the detailed study alternatives.

**Comment:** “The project need appears to be based solely upon past population growth numbers in the two counties from 1990 to 2000 and 2000 to 2010.”

**Response:** The needs to be addressed by the proposed project are detailed in Section 1.3.1 of the DEIS (Section 1.3.1 of this document). These include traffic carrying capacity, safety, and transportation demand. USEPA concurred with the project purpose and need at a NEPA/Section 404 merger team meeting held on September 21, 2006.

Traffic forecasts for the base year (2008) and horizon year (2035) were prepared for the project in June 2008 using output from the Wilmington Metropolitan Planning Organization’s Travel Demand Model. The Travel Demand Model uses various socioeconomic data to forecast growth in order to predict demands on a transportation network. Regional growth expectations help to determine projected traffic in a horizon year. Assumptions about future development activity and changes in distribution of population and employment in the forecast study area are implicit in the model. It is anticipated there will be periods where housing and employment market trends will fluctuate up and down through the horizon year.

**Comment:** “The DEIS does not separate seasonal peak traffic numbers from the Average Annual Daily Traffic (AADT).”

**Response:** Traffic analysis for this project was based on peak hour analysis as a percentage of the average annual daily traffic. Seasonal peak traffic numbers would likely be higher than the average annual daily traffic numbers presented in the DEIS.

**Comment:** “The DEIS does not provide a break down by year of population growth rates within the demographic area. EPA would not anticipate that population growth



rates from 2008 to present are at the same substantial percentage levels as was seen earlier in the decade. These 2035 population projections do not appear to take into account the project setting and the availability of other necessary infrastructure.”

**Response:** September 2011 annual population projections for New Hanover and Pender Counties, obtained from the North Carolina Office of State Budget and Management, show fluctuating growth rates between 1990 and 2030. The annual rates vary between one percent and five percent from 1990 to 2000, between one percent and four percent for the period 2000-2010, and between one percent and two percent for 2010-2030. Ten year trends and projections through the horizon year show growth rates for both counties that are consistently above the state rate, even though the rates have declined or are projected to decline for each decade since 1990-2000. The overall growth rate for the period 1990-2030 is approximately 108 percent for New Hanover County and 128 percent for Pender County. In addition, the Pender County Water Master Plan (McKim and Creed, July 2006), which takes into account available infrastructure such as water and sewer, projects a growth rate for Pender County of 153 percent between 2000 and 2030. For those projections, a moderate growth model, developed in consultation with Pender County, was used.

**Comment:** “Overall, the information contained in the DEIS does not adequately support the purpose and need for multi-lane (6 lanes for Military Cutoff Road Extension and 4 lanes for the Hampstead Bypass) new location roadways, including a 12 to 15 mile freeway and a 3.5 mile, 6-lane boulevard. Other transportation initiatives, such as widening existing roadways, providing interchanges and improved intersection movements, adding turn lanes, providing ‘traffic calming’ measures and other Transportation Systems Management and Travel Demand Management measures could meet current and possible future traffic problems. Regional traffic plans do not fully address the existing traffic conditions of the I-140/Wilmington Bypass and why the northern terminus was selected at its current location if it was not expected to draw regional and seasonal traffic from more congested local routes. Based upon NCDOT studies, I-140/Wilmington Bypass and its interchanges operate successfully at LOS A-C.”

**Response:** NCDOT does not agree with USEPA’s assertion the DEIS does not adequately support the purpose and need. Much of the DEIS information is updated information to what was presented at the 2006 NEPA/Section 404 merger team meeting discussing purpose and need. USEPA concurred along with the entire merger team on the project purpose and need in September 2006.

Figure 5 of the DEIS presents the 2035 levels of service within the project area for the no-build scenario. As Figure 5 shows, the entire length of Market Street and existing US 17 will operate at LOS F in the design year.

Traffic volumes along Market Street and existing US 17 far exceed the existing roadway’s capacity. With the exception of widening the existing roadways, the “other transportation initiatives” USEPA lists in their comment would not appreciably

increase the traffic capacity of the existing facility. The analysis of preliminary study alternatives for the proposed project in Section 2.2 of the DEIS and this FEIS includes the Transportation Systems Management (TSM) Alternative (see Section 2.2.1 of the DEIS and this FEIS) and the Travel Demand Management (TDM) Alternative (see Section 2.2.2 of the DEIS and this FEIS). As discussed in more detail in the respective sections of both documents, the TSM and TDM alternatives would not improve the traffic carrying capacity of Market Street and existing US 17 and an increase in the number of accidents could be expected. Therefore, both alternatives do not meet the purpose of and need for the proposed project and have been eliminated from further consideration. Traffic calming measures would degrade the capacity of the facility. Widening the existing facility (Alternative Z) was studied in detail for this project (see Sections 2.2.4.1 and 2.3.1.1 of the DEIS and Sections 2.2.4.1 and 2.3.1 of this FEIS). USEPA concurred along with the entire merger team to drop Alternative Z from consideration at a merger team meeting held in April 2010.

Based on 2008 traffic volumes, the existing Wilmington Bypass does operate at an acceptable level of service, as shown on Figure 3 of the DEIS (Figure 3 of this document). However, by the year 2035, the Wilmington Bypass will operate at LOS F, as shown on Figure 5 of the DEIS (Figure 5 of this document).

**Comment:** “Recent purpose and need guidance by the Federal Highway Administration (FHWA) indicates that safety issues on existing facilities cannot always be addressed by the construction of new location facilities. Safety improvements along existing US 17 could be accomplished through a multiple [sic] of enhancements, including the addition of auxiliary turn lanes, restricting driveway access, improved signal timing, reducing the posted speed limit, increased signage, etc. Considering the rural and suburban nature of a majority of the project study area, new location and multi-lane facilities combined with existing safety concerns along US 17 will potentially increase the number and severity of accidents.”

**Response:** The addition of turn lanes, improving access control, etc. would likely improve safety along the existing roadway. However, these improvements would not address the capacity issues along the existing roadway as well as the proposed alternatives. As discussed previously, statewide crash rates do not support USEPA’s contention that new location roadways will potentially increase the number and severity of accidents. Statewide total, fatal, and injury crash rates for rural freeways are much lower than the crash rates for urban and rural facilities with no control of access or partial control of access.

### **Preliminary and Detailed Study Alternatives**

**Comment:** “The DEIS includes discussions in Section 2.2 regarding Transportation Systems Management (TSM) Alternative, Travel Demand Management (TDM) Alternative and Mass Transit Alternatives. These transportation alternatives were not given full consideration and were eliminated from detailed study because they did not

meet the purpose and need for the proposed new location projects. These alternatives were given only cursory consideration as individual alternatives and were never considered in combination along with other select improvements to existing roadways and intersections.

Under the Mass Transit Alternative, EPA notes that NCDOT has concluded that there is a potential lack of demand. EPA requests a copy of the public survey and other traffic studies that support this conclusion. The DEIS also cites ‘a diversity of trip origins and destinations’. EPA requests a copy of the origin/destination (O/D) study that was prepared to support this position.”

**Response:** TSM, TDM, and Mass Transit Alternatives were considered to the extent necessary to determine whether or not they would meet the project purpose and need. None of these alternatives would meet the project purpose and need, even if combined. Traffic volumes along existing Market Street and existing US 17 greatly exceed the capacity of the facilities.

The conclusion that there is a potential lack of demand for mass transit is based on observation of the project area. As discussed in the DEIS, there are a number of origins and destinations in the area. However, if one was to assume that there is sufficient demand for transit such that increased transit would reduce traffic volumes along Market Street and existing US 17 by 20 percent, eight lanes would still be required along portions of existing US 17. It would require approximately 479 buses to carry enough passengers to reduce traffic on the highest volume sections of the existing facility by 20 percent. Increased transit will not meet the purpose and need of the project.

**Comment:** “The DEIS discusses the N.C. Strategic Highway Corridor (SHC) vision plan adopted by the N.C. Board of Transportation in 2004 as part of the purpose and need for the project. The SHC was not included in the purpose and need that Merger team representatives concurred on in September of 2006. The extension of Military Cutoff Road is designated as a boulevard in the SHC plan. The Hampstead Bypass is depicted in the 2004 SHC vision plan as a new location freeway that follows the most westerly routes of some of the Detailed Study Alternatives (DSAs). Without fully examining other transportation alternatives or knowing the full extent of traffic problems on US 17/Market Street, it was determined in 2004 that new multi-lane routes would be the ‘vision’ for the corridor.”

**Response:** Section 1.3.5 of the DEIS recognizes the proposed project has been designated by NCDOT as a Strategic Highway Corridor. The DEIS does not include the language related to the SHC Vision in the purpose statement or in the summary of need for the proposed action. However, NCDOT recognizes the location of this discussion could be confusing and has moved this discussion to Section 3.2 (Land Use and Transportation Planning) in this FEIS.

**Comment:** “The DEIS does not explain the correlation between the traffic problems on existing US 17/Market Street and the need for additional traffic carrying capacity, new multi-lane routes of travel that are at a substantial distance from the poor LOS areas and intersections, and areas with higher accident rates shown on Page 2-2.”

**Response:** Section 1.2 of the DEIS and this FEIS explains the purpose of the project and lists several benefits of the project. The purpose of the project is to improve the traffic carrying capacity and safety of the US 17 and Market Street corridor within the study area. The projects will reduce congestion and increase safety on existing Market Street by reducing traffic volumes on portions of that roadway. The proposed Hampstead Bypass will provide a freeway with much greater traffic carrying capacity for the US 17 corridor than the existing roadway.

**Comment:** “EPA does not believe that other ‘non-new location’ transportation alternatives either singly or in combination were given full consideration in the DEIS.”

**Response:** NCDOT gave consideration to all “non-new location” alternatives identified in the DEIS, in particular their ability to meet the proposed project’s purpose and need. As discussed previously, the “improve existing” alternative (Alternative Z) was eliminated from further study at the April 20, 2010 NEPA/ Section 404 merger team meeting. USEPA concurred with the decision to eliminate Alternative Z.

**Comment:** “The DEIS includes a comparison of 23 preliminary corridor alternatives (Alternatives A through W and Z) for the Hampstead Bypass and 2 preliminary corridor alternatives (Alternatives M1 and M2) for the Military Cutoff Road Extension. Many of these preliminary study corridors were apparently identified by NCDOT to strictly avoid residential relocations within the proposed 300-foot corridor without any context sensitive regard to natural system impacts (e.g., Alternative W: 501.5 acres of wetland impacts and 63 residential relocations).”

**Response:** During the development of the preliminary build alternatives, efforts were made to avoid and minimize impacts to wetlands and streams wherever practicable. Preliminary build alternatives (Section 2.2.4 of the DEIS and this document) were established through an evaluation of suitability mapping based on available socioeconomic, cultural, and environmental resource data. Potential corridor alternatives were screened for suitability based on several criteria, including meeting the purpose and need for the proposed project, minimizing impacts to natural resources, and consideration of community features. Roadway alignments which meet design criteria were developed and placed within the 1,000-foot corridors to minimize impacts to resources.

Alternative W is one of the few preliminary alternatives developed outside of this process. The Alternative W alignment was prepared in response to a request from the merger team at the May 9, 2007 alternative screening meeting.

**Comment:** “The DEIS design for DSA U indicates a 250 to 350 [foot] right of way required for this DSA. The DEIS does not provide a specific justification for this proposed width compared to the other alternatives under consideration. This right of way width is also contradictory to the environmental commitment included on page 1 of 2 of the ‘Green Sheets.’”

**Response:** Wider right-of-way is proposed for Alternative U because ten lanes and service roads are required along the portion of Alternative U which follows existing US 17 north of the Wilmington Bypass. Alternative U typical sections are presented in Sections 2.4.2.2.1 of the DEIS and this FEIS. These sections include a discussion of other typical sections which were considered for this portion of Alternative U.

There were typographical errors related to the proposed right-of-way widths in Section 2.4.2.3 and on Figure 11A of the DEIS. A variable right-of-way width of 200 to 350 feet was proposed for Detailed Study Alternatives E-H, O, and R, not 250 to 350 feet as stated in the DEIS. A variable right-of-way width of 200 to 520 feet was proposed for Alternative U, not 250 to 520 feet as stated in the DEIS.

Since the completion of the DEIS, it was determined the proposed clearing for the six lanes proposed for the northern section of the proposed bypass, including along the portion of existing US 17 between the bypass tie-in and Sloop Point Loop Road, will exceed 200 feet in some areas. The proposed right-of-way width through RCW Cluster 17 is now 250 feet, and through Cluster EC is now 225 feet. Although the proposed clearing will exceed 200 feet in some areas, based on new proposed regional RCW Standard for Managed Stability (SMS) foraging habitat guidelines that USFWS agreed to use for this project (see Section 4.5.4.3 of this document), the December 2012 foraging habitat analysis found that clearing greater than 200 feet along existing US 17 within the foraging partitions would not result in the take of an additional RCW cluster. The commitment to maintain a maximum right-of-way width in the vicinity of Holy Shelter Game Land has been removed from the Project Commitments section of this FEIS.

**Comment:** “The 5 DSAs under consideration in the DEIS do not necessarily meet the requirements under 40 CFR Part 1502.14.”

**Response:** NCDOT believes the DEIS meets the requirements under 40 CFR Part 1502.14. Chapter 2 of the DEIS presents the environmental impacts of the proposal and the alternatives in comparative form. All reasonable alternatives are explored and evaluated. Reasons leading to the elimination of alternatives from detailed study are discussed. Each alternative considered in detail is fully described so that reviewers may evaluate their comparative merits. Reasonable alternatives are discussed. The No-Build or “No Action” alternative is included. NCDOT did not elect to identify a preferred alternative prior to receiving additional public and agency input; therefore, no preferred alternative was identified. Discussion of measures taken to minimize impacts to the red-cockaded woodpecker is presented. Additional

discussion regarding mitigation is included in other sections of the DEIS. A mitigation plan is being developed for NCDOT's preferred alternative.

**Comment:** "Traffic carrying capacity and accident issues are located south of the I-140/Wilmington Bypass interchange along US 17. These issues were discussed during previous Merger team meetings and agencies were informed that the NCDOT would evaluate a full range of alternatives that would singly or in combination meet the purpose and need. The initially proposed project study area was expanded at the request of the USACE and other agency representatives to insure that a full suite of reasonable alternatives would be explored during the NEPA process."

**Response:** Over the course of four meetings, alternatives were discussed with the merger team. Detailed study alternatives were selected and concurred on by the merger team, including USEPA, based on their ability to meet purpose and need and minimize impacts. The detailed study alternatives address traffic carrying capacity and safety issues on Market Street and US 17 within the project study area.

### **Human Environment Impacts** **Relocations**

**Comment:** "The DEIS included non-profit organizations in the business relocation totals. This is not a common NCDOT practice nor consistent with current NEPA/Section 404 Merger guidance."

**Response:** NCDOT does not have a standard way of presenting non-profit organization relocation information in impact tables. It varies as to whether non-profit organizations are listed separately or included in the business totals. Merger process information guidance does not address listing non-profit organization relocatees on impact tables. Table 4-1 of the DEIS has been updated in this FEIS to include a separate row for non-profit relocations.

**Comment:** "In addition, NCDOT also included a church, cemetery graves and a '0 employee' daycare in the Appendix C business relocations for U-4751 Alternatives M1 and M2...Appendix C appears to 'double count' certain business relocations. For DSA U, the report includes the relocation of 9 non-profit organizations, including 7 churches. This report identified a cell tower will be 'isolated' by this alternative as well as water tanks for the Belvedere Plantation subdivision. However, this relocation report does not identify at least two existing water supply wells operated by Cape Fear Public Utility Authority that will be impacted by both DSA M1 and M2 (Page 4-22 of the DEIS). EPA requests that a consistent and accurate analysis of residential and business relocations be provided to EPA and other Merger team agencies prior to the CP3 LEDPA meeting and included in the FEIS."

**Response:** The DEIS relocation reports for Alternatives M1 and M2 incorrectly included Enoch Chapel, Enoch Chapel Graveyard, and Ogden Volunteer Rescue in the business relocation totals. Enoch Chapel and Ogden Volunteer Rescue were also listed under non-profit organizations. The DEIS listed 65 business relocations

(including non-profit organizations) for Alternatives M1 and M2. The correct number is 62 (including non-profit organizations). Updated relocation reports based on the revised preliminary design were prepared for NCDOT's preferred alternative and are included in Appendix E of this FEIS. As stated previously, Table 4-1 of the DEIS has been updated in this FEIS to include a separate row for non-profit organization relocations.

The information regarding the cell tower and water tanks in the DEIS relocation reports was included as notes to the project engineers of items the right-of-way agent observed during the field review. The relocation report is not intended to present the utility impacts of the project.

### **Community Resources**

**Comment:** "Access to Prospect Cemetery is expected to be eliminated by either DSA M1 or M2. Page 4-2 of the DEIS states that access to Prospect Cemetery will be evaluated during final roadway design. EPA believes that this is a known impact resulting from the Military Cutoff Road Extension and access road options and associated impacts should have been identified in the DEIS, including potential impacts to jurisdictional wetlands and streams."

**Response:** As discussed in Section 4.1.2 of this FEIS, access to Prospect Cemetery has been provided by a break in the proposed control of access at the existing driveway for the cemetery. No wetland or stream impacts are associated with the provision of this access.

**Comment:** "The DEIS identifies an impact under DSA M1 and M2 to a driving range (golf) under community facilities and services. This is a commercial business (#57 under Business Relocations) and not a public or non-profit community facility. The DEIS does identify that Holly Shelter Game Land is located in the project study area. However, unlike the driving range, it is a public and community facility as well as a gameland and preservation area. It is used extensively by the public. EPA requests that inaccuracies contained in the DEIS be addressed in the FEIS."

**Response:** The driving range has been removed from the list of community facilities in this FEIS. Holly Shelter Game Land is included in the list of community facilities in the DEIS (see the fifth bullet under Section 3.1.3). The impacts to Holly Shelter Game Land as a community facility also are discussed in the DEIS in the first paragraph of Section 4.1.2 (Section 4.1.2 of this FEIS).

**Comment:** "Mount Ararat AME Church, a historic property, is also expected to be impacted by DSA M1 or M2. In addition, the DEIS also indicates that grave sites in this cemetery could also be impacted but does not quantify the potential number of grave sites. In the Appendix C relocation report, it is provided that DSA U will reportedly impact 647 +/- grave sites: Wesley Chapel United Methodist Church (395 +/- graves), McClammy and King Family Cemetery (17 +/- graves) and Pollock's Cemetery (235 +/- graves). The number of grave sites in the relocation report for DSA M1 and M2 under

TIP project number U-4751 is not provided. Potential cemetery impacts for DSAs E-H, O and R are not identified in the report.”

**Response:** Section 4.1.2 of this FEIS notes that no cemeteries would be impacted and no graves would be relocated with Hampstead Bypass Alternatives E-H, O, and R. The number of cemeteries that would be impacted and the number of graves that would be relocated by Military Cutoff Road Extension Alternatives M1 and M2 also are noted in Section 4.1.2 of this FEIS.

**Comment:** “Ogden Park is described on Page 4-2 of the DEIS and discusses the park boundary that was designed to accommodate a future transportation corridor through the middle of the county park. In addition: ‘Pedestrian access to existing multi-use path facilities and Ogden Park would be improved if pedestrian facilities are constructed.’ There is no identification of any proposed pedestrian facilities between the two sections of the park.”

**Response:** This statement was made in reference to the Wilmington MPO’s request for the inclusion of a multi-use path along the proposed Military Cutoff Road Extension. As noted in the “Project Commitments” section and in Sections 2.4.2.2.2, 4.2.2.3, and 5.3.13 of the DEIS, the multi-use path would tie into the existing multi-use path along Military Cutoff Road. As discussed in these same sections of this FEIS, NCDOT will continue to coordinate with the Wilmington MPO on the inclusion of a multi-use path along Military Cutoff Road Extension.

### **Farmland Impacts**

**Comment:** “Prime farmland impacts are quantified for each DSA in Table 4-5...Section 4.3.3 does not reference the required AD-1006 forms. EPA is unable to locate the forms in the DEIS appendices. EPA requests how these very exact impact numbers were calculated and if the Natural Resource Conservation Service (NRCS) completed AD-1006 forms for the DSAs. The DEIS does not provide any further information concerning potential N.C. Voluntary Agricultural Districts (VADs) or what measures to minimize farming impacts might be appropriate (e.g., Equipment access across dissected fields). According to the N.C. Department of Agriculture and Consumer Services, Pender County in 2008 was working towards establishing VADs. Sections 3.3.3 and 4.3.3 of the DEIS fails to provide the relative importance of farming and other forest products for the Pender County economy and its employment contribution. Prior to the issuance of a FEIS, EPA recommends that supplemental information and analysis be provided regarding prime farmland and other agricultural land impacts resulting from the proposed project.”

**Response:** Natural Resource Conservation Service (NRCS) CPA-106 forms were completed for this project. The forms are located in Appendix B of the DEIS and this FEIS. A reference to these forms has been added to the farmland impacts discussion in this FEIS. Prime and unique farmland soils were identified for New Hanover and Pender Counties. Impacts presented in Table 4-5 of the DEIS were



calculated by overlaying the detailed study alternative's impact boundary on the soil information. The farmland impacts have been rounded to the nearest whole acre in this FEIS (see Table 4-6). This FEIS also discusses that Pender County adopted a Voluntary Farmland Preservation Program Ordinance in December 2010, which provides for the creation of Voluntary Agricultural Districts (VADs). As of February 2014, no properties have received the VAD designation; however, Pender County plans to accept applications from property owners who would like their land designated as a VAD in the near future (Pender County, personal communication). New Hanover County does not have a VAD program. As noted in the DEIS, NRCS indicated the detailed study alternatives in New Hanover County and portions of the study area in Pender County were considered exempt from evaluation of prime farmland impacts. Coordination with the NRCS on an updated CPA-106 form for NCDOT's preferred alternative determined the accepted methodology for determining exempt areas has changed. As a result, the area considered exempt from evaluation of prime farmland impacts is reduced and acres of impact have increased. The relocation reports provided in Appendix C of the DEIS did not note impacts to farms. The updated relocation report included in Appendix E of this FEIS shows the proposed project will impact a blueberry farm located north of the Topsail Schools complex.

Section 3.3.3 of the DEIS has been updated in this FEIS to describe the agricultural economy of Pender County. Section 4.3.3 of the DEIS also has been updated in this FEIS to note the proposed interchange at US 17 where Alternatives M1+U and Alternative M2+U would go on new location is zoned as "Agriculture". However, this area is classified as an "Urban Growth Area" in the Pender County CAMA Land Use Plan and "Mixed-Use" in the Coastal Pender Small Area Plan.

### **Noise Receptor Impacts**

**Comment:** "Total noise receptor impacts are shown in Table 4-4. However, design year 2035 traffic noise levels that are expected to approach or exceed the NAC are different than from the table."

**Response:** There are two mistakes in Section 4.3.1.1 of the DEIS in the text preceding Table 4-4. The text incorrectly states that the noise impacts discussed for the separate detailed study alternatives for the US 17 Hampstead Bypass and Military Cutoff Road Extension are the number of receptors that are expected to approach or exceed the NCDOT NAC in the design year. Rather, the impacts listed are the total impacts (i.e., receptors approaching or exceeding the NCDOT NAC and substantial increases) for these alternatives. There is also a mistake in the number of receptors that would be impacted for Alternative E-H; the DEIS states 118 receptors, but the correct number is 110 receptors. The total impacts shown in DEIS Table 4-4 for the five detailed study alternatives for the overall project are obtained by combining the impacts discussed in the text for the separate alternatives. For example, based on the corrected text preceding Table 4-4, Alternative E-H would impact 110 receptors and Alternative M1 would impact 147 receptors, so the total impact for Alternative

M1+E-H is 257 receptors, as shown in DEIS Table 4-4. The traffic noise impacts for the DEIS detailed study alternatives and NCDOT's preferred alternative have been updated since the DEIS in accordance with the current (July 2011) NCDOT Traffic Noise Abatement Policy (see Table 4-3 of this FEIS).

### **Historic Properties and Archaeological Sites**

**Comment:** "...Thus, all of the DSAs have at least one adverse effect on a historic property. There is no identified avoidance alternative. The impacts to historic properties from DSA U are based upon using a 'freeway' design along portions of existing US 17 and including parallel service roads. Some of the impacts to historic properties may be avoided or minimized if other reasonable designs are pursued during final design."

**Response:** Two of the historic properties along Alternative U, Poplar Grove and Wesleyan Chapel United Methodist Church, are directly across from each other on existing US 17. Any widening of the existing road would affect at least one of these properties. Sections 2.4.2.2.1 of the DEIS and this FEIS provide an extensive discussion regarding the proposed typical section for Alternative U and presents alternative typical sections that were examined. NCDOT has coordinated with the State Historic Preservation Office on effects to historic architectural resources. As discussed in Section 4.4.1 of this FEIS, additional minimization measures incorporated into Alternative U resulted in eliminating adverse effects to the Scotts Hill Rosenwald School. Section 4.4.1 also discusses additional avoidance and minimization measures for impacts to historic properties incorporated into the preliminary designs of the detailed study alternatives since the release of the DEIS.

### **Hazardous Materials**

**Comment:** "Section 3.3.5 on hazardous materials is not accurate and should be corrected in the FEIS. Hazardous materials are regulated by the U.S. Department of Transportation (USDOT) under 49 CFR Parts 100-185. This section of the DEIS does not conform to other NEPA documents prepared by the NCDOT and reviewed by the EPA. Hazardous materials are identified in the 'Impacts to the Physical Environment' section and not in the 'Human Environment Impact' section.

Some of the identified 'geoenvironmental' sites described in this section may meet the cleanup requirements of more than one Federal statute. Only 5 of the 28 sites referenced in Section 3.3.5 are described in Section 4.3.5. These 5 sites are associated with DSA M1 and M2. There is no qualifying description of the phrase: 'low geoenvironmental impacts'. Details concerning the other 23 hazardous material sites is not provided in the DEIS. Supplemental information and analysis should be provided to EPA prior to the issuance of the FEIS. This future geotechnical investigation and evaluation should include the potential for existing hazardous material sites and underground storage tanks to contaminate shallow groundwater resources."

**Response:** The wording of Section 3.3.5 of the DEIS has been modified in Section 3.3.5 of this FEIS for clarity. The DEIS includes the discussion of hazardous

materials in the Physical Environment Characteristics and Impacts to the Physical Environment sections in accordance with NCDOT EIS guidance. The 35 known and potential hazardous materials sites within the study area, including the 28 sites that may contain USTs referenced in Section 3.3.5 and shown on Figures 10A through 10K of the DEIS, are described in table format in this FEIS (see Table 3-5). Sections 4.3.5 of the DEIS and this FEIS include information related to those sites that may be impacted by the project. Site assessments to identify the nature and extent of any contamination at sites impacted by NCDOT's preferred alternative will be performed before right-of-way acquisition. Section 3.3.5 of this FEIS also clarifies that the term "low geo-environmental impacts" indicates the anticipated impacts severity of potentially contaminated sites on the detailed study alternatives is low and little to no impacts to cost or schedule are anticipated.

### **Natural Resources Impacts** **Groundwater Impacts and Water Supply Wells**

**Comment:** "The Cape Fear Public Utility Authority (CFPUA) is reported to have several existing and proposed well sites associated with the Nano Water Treatment Plant (NWTP). Section 4.5.3.1.1 identifies that DSA M1 and M2 cross two existing well sites operated by the CFPUA. Additionally, DSA M2 would also impact two additional existing CFPUA well sites (to total 4) and a proposed well site. DSA M2 is anticipated to impact a raw water line and concentrate discharge line that provides a connection to several anticipated well sites. The DEIS states that estimates provided by CFPUA include the loss of up to 6 million gallons per day (mgd) of anticipated future water supplies for the project study area. The DEIS lacks any specificity as to what the loss of the existing water supplies might be, what the potential to feasibly relocate the wells might be, or what the costs might be should either DSA M1 or M2 be selected."

**Response:** As discussed in Section 4.5.3.1.1 of this FEIS, since completion of the DEIS, the preliminary designs of both Alternatives M1 and M2 have been modified to avoid existing and proposed well sites. Based on these design modifications, none of the detailed study alternatives will require the relocation of a public water supply well. Any water lines crossed by the project will be relocated.

**Comment:** "DSA U is also expected to impact 3 existing 'transient' non-community water supply wells in the vicinity of the proposed US 17 interchange at Sidbury Road and Scott Hill Loop Road. Transient non-community wells are described as being ones that serve 25 or more people at least 60 days out of the year at facilities such as restaurants and churches. The DEIS does not provide any additional information regarding these impacts, including current withdrawal rates, the availability of alternative drinking water supplies, the costs to owners to relocate wells, etc."

**Response:** Section 4.5.3.1.1 of this FEIS notes that now only two non-community water supply wells are being impacted by Alternative U due to minimization measures incorporated into the Alternative U interchange at Sidbury Road.

NCDOT's preferred alternative would not impact any non-community water supply wells.

Section 4.5.3.1.1 of this FEIS also explains that for any impacted private wells, during the right-of-way acquisition process NCDOT will compensate property owners for the expense of drilling a new well or connecting to a public water system, as appropriate. If an alternate water supply is not available for a property, NCDOT will purchase the property and provide relocation assistance.

**Comment:** "The DEIS does not address what the potential for contamination to existing well fields will be. The depth and distance of CFPWA well sites is not provided with respect to the alternatives under consideration. The potential threat from hazardous material accidents to other existing wellheads is not evaluated in the DEIS.

The full impacts to water supplies are not detailed in the DEIS. EPA believes that the construction of either DSA M1 or M2 will potentially violate this Clean Water Act requirement. NCDOT should also refer to the Safe Drinking Water Act for additional requirements. The DEIS fails to provide any potential avoidance or minimization measures or mitigation to address the loss of current and future water supplies in the project study area."

**Response:** Section 4.5.3.1.1 of this FEIS addresses the potential for contamination to existing wells and identifies the distance of the wells from the detailed study alternatives (see Table 4-13). Well depth information is also provided. Section 4.5.3.1.1 also discusses measures that were and/or could be taken to avoid, minimize, or mitigate impacts to the CFPWA water supply wells. A qualitative assessment of the project impacts to public water supply wells was provided to USEPA and the merger team by e-mail on February 9, 2012. An addendum to the assessment was provided by e-mail on May 1, 2012.

### **Jurisdictional Streams and Wetlands**

**Comment:** "NCDOT provided the DWQ Wetland rating for each of the 286 wetland systems. The DEIS did not provide wetlands ratings using the multi-agency accepted North Carolina Wetlands Assessment Methodology (NCWAM)."

**Response:** NCDOT was not rating wetlands using NCWAM at the time the delineations occurred.

**Comment:** "Section 4.5.4.1 contains a discussion on avoidance and minimization of impacts to jurisdictional resources...Seventeen (17) major hydraulic crossings were identified during the CP 2A field meeting. Thirteen (13) structures are various sized reinforced concrete box culverts (RCBC) and one existing RCBC is proposed to be extended. The DEIS does not identify any additional avoidance and minimization measures to reduce impacts to jurisdictional streams and wetlands, such as reduced median widths, increased side slopes, the use of single bridges and tapered medians, retaining walls, reduced paved shoulders, etc."

**Response:** Section 4.5.4.1.1 of the DEIS discussed the avoidance and minimization measures for impacts to Waters of the United States incorporated into the preliminary designs of the detailed study alternatives, and Section 4.5.4.1.1 of this FEIS discusses the additional avoidance and minimization measures incorporated into the preliminary design of NCDOT's preferred alternative since the release of the DEIS. The NEPA/Section 404 merger team concurred on avoidance and minimization measures for Military Cutoff Road Extension in September 2012 and for US 17 Hampstead Bypass in June 2013. Copies of the signed Avoidance and Minimization concurrence forms are included in Appendix C of this FEIS. The merger team concurred on avoidance and minimization measures for the two proposed service roads for Military Cutoff Road Extension in April 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team has not yet concurred on avoidance and minimization measures for the eight proposed service roads for the US 17 Hampstead Bypass. As documented in the "Project Commitments" section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. The Project Commitments section also documents the other avoidance and minimization measures incorporated into the preferred alternative. Additional potential measures to reduce impacts to Waters of the United States with the preferred alternative will be reviewed with the merger team at Concurrence Points 4B and 4C.

**Comment:** "Considering the magnitude and severity of the impacts to high quality streams and wetlands, EPA requests a conceptual mitigation plan prior to the selection of a LEDPA and the issuance of a FEIS. There are no details as to what mitigation opportunities are available on-site and what credits or mitigation assets are available through the EEP. Considering the location of the proposed project and the presence of high quality waters of the U.S., the conceptual mitigation plan should be sufficiently detailed and provide for full compensation for lost functions and values to high quality resources."

**Response:** NCDOT does not typically extensively investigate on-site mitigation opportunities until after the LEDPA has been chosen. Since the merger team concurred on NCDOT's preferred alternative as the LEDPA at the May 17, 2012 CP 3 merger team meeting in accordance with the procedures detailed in the NEPA/Section 404 Merger Process, NCDOT has investigated potential on-site wetland and stream mitigation sites in coordination with USACE. On-site mitigation will be used as much as possible; however, NCDOT's memorandum of agreement with the NCDENR Ecosystem Enhancement Program limits on-site mitigation to sites adjacent and contiguous with the roadway corridor.

**Comment:** "During the Merger process, EPA also learned that several NCDOT mitigation sites associated with the I-140/Wilmington Bypass might be impacted from [sic] the proposed project, including the 'Plantation Road Site'. From Figure 10C of the DEIS, it appears that the '34-acre Residual Site' might also be impacted from several of

the DSAs. From Figure 10D, it appears that the ‘Corbett Strip Residual Site’ is probably going to be impacted from several of the DSAs. Discussions in the DEIS regarding the potential impacts to these NCDOT mitigation sites is included in Section 3.3.8.3. Impacts to these sites are not specifically identified in the summary table S-1 but are addressed Table 4.3.8.3. Additional information including credit/debit ledgers, restrictive covenants and easements, and other property records is being requested by EPA prior to the selection of a LEDPA and the issuance of a FEIS. NCDOT should avoid impacting approved mitigation sites that were required for compensation for previous highway project impacts (i.e., I-140/US 17 Wilmington Bypass).”

**Response:** At a merger team meeting held on December 15, 2011, additional details were provided regarding these mitigation properties. This information is included in Section 3.3.8.3 of this FEIS.

### **Terrestrial Forest Impacts**

**Comment:** “Terrestrial forest impacts include[d in] Table S-1 summary of impacts for the DSAs are as follows: DSA E-H+M1: 518 acres; DSA O+M2: 512 acres; DSA R+M1: 472 acres; DSA U+M1: 406 acres and DSA U+M2: 455 acres. These impact numbers do not match the terrestrial community impacts shown in Table 4-9. Eliminating the impact estimates to ‘maintain[ed] and disturbed communities’ still does not provide for an accurate estimate of terrestrial forest impacts. The FEIS should identify how the terrestrial forest impacts were calculated for each DSA and what natural communities were included in the estimates.”

**Response:** There were errors in the forest impacts shown for the DEIS detailed study alternatives in Tables S-1, 2-3, and 4-10 of the DEIS. These tables have been corrected in this FEIS.

**Comment:** “EPA notes the comment concerning Executive Order 13112 on Invasive species and NCDOT’s Best Management Practices (BMPs). EPA acknowledges the NCDOT invasive plant species list in Section 3.5.2.1.2 of the DEIS. The FEIS should identify specific BMPs to be followed to minimize the spread of invasive plant species following construction and provide detailed environmental commitments on how these BMPs are to be implemented. It would be useful to the public and decision-makers if NCDOT could provide previous project examples where these invasive species BMPs have cost-effectively resulted in the long-term elimination or reduction in invasive plant species following roadway construction activities. There are numerous Significant Natural Heritage Areas that are present in the project study area and the proposed new location alternatives represent a significant long-term threat to these unique habitats resulting from the introduction of aggressive and persistent roadside invasive plant species.”

**Response:** Additional discussion on Best Management Practices to be followed regarding invasive species is included in Section 4.5.2.1.1 of this FEIS.

### **Threatened and Endangered Species**

**Comment:** “Sections 3.5.4.3 and 4.5.4.3 address protected species, including Federally-listed species under the Endangered Species Act (ESA). Considering the potential impacts to NCWRC’s managed Holly Shelter Game Land, the DEIS should have also identified any State listed species under their jurisdictional [sic] and within the project study area.”

**Response:** NCDOT does not survey for state-listed species, as the state law does not apply to NCDOT activities. As shown in Table 4-8 of the DEIS and this FEIS, the proposed project will not have any direct impacts to Holly Shelter Game Land.

**Comment:** “Generally, EPA has significant environmental concerns regarding wildlife habitat loss and fragmentation resulting from most of the DSAs, including E-H, O and R. Potential animal/vehicle collisions involving new location, multi-lane, high speed facilities in rural areas in close proximity to game lands and other preservation areas need to be analyzed and studied prior to the issuance of a FEIS.”

**Response:** The potential for crashes involving animals along the proposed project is discussed in Section 4.5.2.1.2 of this FEIS.

### **Other Environmental Issues**

**Comment:** “Regarding socio-economic issues, EPA acknowledges the following DEIS comment: ‘It is anticipated that the proposed project will enhance long-term access and connectivity opportunities in New Hanover and Pender County and will support local, regional and statewide commitments to transportation improvement and economic viability’. Enhanced long-term access and connectivity are not part of the purpose and need for the proposed project that EPA and other Merger Team agencies agreed with in 2006.”

**Response:** This statement is included in Section 4.9 of the DEIS and this FEIS, “Relationship between Long-Term & Short-Term Uses/Benefits.” This information is presented as a project benefit, not as a part of the purpose and need. It is not included in the Purpose and Need chapter.

**Comment:** “Impacts to Holly Shelter Game Land and the 22-Acre Residual Site should be removed from the table as all of the impacts are ‘zero’ to these two areas. The total impacts for the DSAs are as follows: DSA E-H+M1: 4.43 acres; DSA O+M2: 42.94 acres; DSA R+M1: 5.01 acres; DSA U+M1: 3.24 acres and DSA U+M2: 34.40 acres. Most of the impacts are associated with DSA M2 and are to the Plantation Road and 34-Acre Residual mitigation sites. These significant impacts should be included in Table S-1 and future impact tables.”

**Response:** NCDOT does not agree with USEPA’s comment to remove Holly Shelter Game Land and the 22-Acre Residual Site from Table 4-7 of the DEIS, as it is important for the reader to know that none of the alternatives will affect these

sites. As noted in USEPA's comment, this table provides details associated with the detailed study alternatives' impacts to game lands and preservation areas, similar to the way Table 4-11 of the DEIS details individual stream impacts or Table 4-17 of the DEIS details federally-protected species impacts. The impacts to mitigation sites are summarized in Table S-1 of the DEIS and this FEIS.

### **Indirect and Cumulative Effects**

**Comment:** "EPA does not agree with the assumptions and conclusions in the indirect and cumulative effects section of the DEIS. The analysis cites travel time benefits without providing the specific travel time savings or other traffic analyses required to make such a claim. The analysis ignores a critical component: water supply within the project study area and the importance it may have on current and future development and land uses. Furthermore, the qualitative ranking in Tables 4-18 and 4-19 are not supported by actual data or facts. These ranking appear to be very subjective and based upon past trends and not upon more recent socio-economic factors. The relationship of the information contained in Table 4-20 compared to the proposed project is not made clear in Section 4.6. Considering the significant impact predicted for the project study area watersheds, EPA is requesting a review copy of the indirect and cumulative quantitative water quality impacts analysis that was requested by the NCDWQ and prior to the issuance of a FEIS."

**Response:** Section 4.6.1 of the DEIS (Section 4.6.1 of this document) states the Hampstead Bypass will result in more than ten minutes in travel time savings. The DEIS further explains this time savings results from free-flow conditions of the bypass compared to the traffic signals and congestion of the existing facilities.

The ICE screening matrices used in the DEIS are not the most current quasi-quantitative matrices used in ICE analysis. The "Relative Rating of Indirect and Cumulative Effects" matrices (Tables 4-18 and 4-19 of the DEIS) reflect the version in effect at the time the combined Community Impact Assessment and Qualitative Indirect and Cumulative Effects Assessment was prepared. Since that time, the screening matrix has been updated to include additional categories and a quantitative component.

Subsequent to the release of the DEIS, an updated Indirect and Cumulative Effects (ICE) Analysis, including an Indirect and Cumulative Effects Screening Report and Land Use Scenario Assessment (September 2013), was completed for the proposed project. Information from the updated ICE analysis is incorporated in Section 4.6 of this FEIS. The updated ICE analysis includes information about water and sewer.

Table 4-20 of the DEIS presents baseline watershed data, including wetland and stream data, for the project area. USEPA will be provided a copy of the quantitative water quality impacts analysis. This assessment will be performed prior to requesting the Section 401 Water Quality Certification from NCDWR, which is required before issuance of the Section 404 Permit by USACE.



#### **5.5.1.2 STATE AGENCIES**

##### **North Carolina Department of Agriculture and Consumer Services – Agricultural Services – October 31, 2011**

**Comment:** “The North Carolina Department of Agriculture and Consumer Services (NCDA&CS) is concerned about the conversion of North Carolina’s farm and forest lands to other uses. Due to the importance of agricultural activities in the area, as well as the economy of the entire state, NCDA&CS strongly encourages the project planners to avoid conversion of agricultural land to other uses whenever possible. When avoidance is not possible, all reasonable efforts to minimize impacts to farming operations and agricultural land should be implemented.”

**Response:** Detailed study alternative impacts to forest and areas with prime and unique farmland soils were considered in the DEIS and were a factor in the selection of the LEDPA. Minimization of impacts will continue to be evaluated through final design. NCDOT has coordinated with the US Department of Agriculture, Natural Resources Conservation Service regarding project impacts to prime and unique farmland.

##### **North Carolina Department of Cultural Resources – State Historic Preservation Office – September 26, 2011**

**Comment:** “No comment at this time.”

**Response:** Comment acknowledged.

##### **North Carolina Department of Environment and Natural Resources – October 26, 2011**

**Comment:** “The Department of Environment and Natural Resources has reviewed the proposed project. The department asks that the Department of Transportation continue to work directly with our commenting agencies during the NEPA Merger Process and take all practicable measures to minimize environmental impacts. This will help avoid delays at the permit phase.”

**Response:** NCDOT will continue to work with agencies through the Merger Process. All practicable measures to minimize impacts to the environment will be taken.

**North Carolina Department of Environment and Natural Resources – Division of Coastal Management – October 19, 2011**

**Comment:** “DCM has concluded that the proposed project will not impact a Coastal Area Management Act (CAMA) Area of Environmental Concern (AEC) as defined by the rules of the NC Coastal Resources Commission. Therefore, the proposed project will not require a CAMA Permit.”

**Response:** Comment acknowledged.

**Comment:** “It is correctly stated that the project will require a Federal Consistency Determination. As a point of clarification, the applicant (NCDOT) is required to evaluate the proposed project and certify to DCM and USACE that the project is consistent with the NC Coastal Management Program. This Consistency Certification includes a review of the state’s coastal program (including the applicable CAMA Land Use Plans) and contains an analysis describing how the proposed project would be consistent to the maximum extent feasible, with the state’s enforceable coastal policies as mandated by the requirements of Federal Consistency (15 CFR 930). No federal license or permit shall be issued by a federal agency until the requirements of Federal Consistency have been satisfied. DCM will issue a public notice and circulate the Consistency Certification with its accompanying supporting documentation to state agencies with potential interest in the project. Upon an internal review of NCDOT’s written analysis of how the project is consistent with the NC Coastal Management Program and the comments received, DCM will either concur with NCDOT’s Consistency Determination or find that the project is not consistent. The Final EIS should include an analysis of the project under Federal Consistency (15 CFR 930).”

**Response:** As discussed in Section 4.5.4.6 of this FEIS, the proposed project with all of the DEIS detailed study alternatives and NCDOT’s preferred alternative would meet the consistency requirement of the Coastal Area Management Act. As discussed in Section 3.5.4.6 of this FEIS, there are no CAMA Areas of Environmental Concern (AEC) present within the study area. During the Section 404 Permit application process, NCDOT will request a Consistency Certification from NCDOT that the proposed project complies with the enforceable policies of the NC Coastal Management Program. The request will include supporting documentation in accordance with 15 CFR 930.58 to provide NCDOT the data necessary to assess the assertion that the project is consistent with the NC Coastal Management Program.

**Comment:** “Alternative M2 would impact an additional two existing Cape Fear Public Utility Authority well sites than alternative M1. M2 would also impact several anticipated future Cape Fear Public Utility Authority well sites. The future well sites were selected based upon aquifer access, anticipated yields, and areas which protect well heads from contamination. It is estimated that up to six million gallons per day of future New Hanover County water capacity could be lost if alternative M2 is selected. Perhaps Table

2-3 Comparison of Current Detailed Study Alternatives should include the ‘Public Water Supply Wells’ feature to reflect the difference in alternatives M1 and M2.”

**Response:** As discussed in Section 4.5.3.1.1 of this FEIS, since completion of the DEIS, the preliminary designs of both Alternatives M1 and M2 have been modified to avoid existing and proposed well sites. Based on these design modifications, none of the alternatives will require the relocation of a public water supply well. In addition, impacts to the availability of the water supply are not anticipated as a result of the proposed project, and the project is not expected to decrease the capacity of the existing and planned water supply infrastructure or the source aquifers. Table S-1 of this FEIS also has been updated to include a summary of the impacts to public water supply wells (100-foot buffer), which is zero for all of the alternatives.

**Comment:** “DCM is concerned with the large amount of wetland impacts of the project. The proposed alternatives E-H, O, and R, from the US 17 Wilmington Bypass to NC 210, are configured with six 12-foot lanes. Based upon NCDOT’s traffic projections, six lanes are required to accommodate future traffic volume in this section. There is no indication whether these projections accounted for seasonal fluctuation due to beach traffic. Only four lanes are proposed for the section from NC 210 to the existing US 17, in order to minimize RCW habitat impacts. Both of these sections are proposed with a 46-foot median and 14-foot outside shoulders. The proposed design includes 14-foot inside shoulders for alternatives E-H, O, and R, from the US 17 Wilmington Bypass to NC 210. If six lanes cannot be reduced to four lanes to reduce wetland impacts, perhaps the medium [median] and/or shoulder widths could be reduced. According to NCDOT’s Roadway Design Manual, it appears that the use of a 22’ width median with concrete barrier on new location or widening projects may be used for those freeway projects that have significant environmental constraints that prohibit or restrict the use of the 46’ or wider median. NCDOT’s Roadway Design Manual also appears to indicate that freeways may use 10-foot shoulders or 12-foot shoulders when truck DHV exceeds 500. Perhaps the shoulder widths could be reduced. The reduction in median and/or shoulder widths can go a long way to reduce wetland impacts.”

**Response:** Traffic analysis for this project was based on peak hour analysis as a percentage of the average annual daily traffic. Seasonal peak traffic numbers would likely be higher than the average annual daily traffic numbers presented in the DEIS. The design criteria used to develop preliminary designs are based on the project’s location, function, and classification. The typical sections used for the proposed Hampstead Bypass and Military Cutoff Road Extension are influenced by the type of facility required to fulfill the project’s purpose and need, providing capacity for existing and future traffic, and safety. Avoidance and minimization measures were discussed with the merger team at the project’s NEPA/Section 404 Merger Concurrence Point 4A meetings. Additional potential measures to reduce impacts to Waters of the United States with NCDOT’s preferred alternative will be reviewed with the merger team at Concurrence Points 4B and 4C.

**Comment:** “Reference is made that the use of Best Management Practices will minimize adverse effects in areas of environmental concern. Rather than the term ‘areas of environmental concern’, the term ‘surface waters’ or ‘water bodies’, should be used as a more accurate term, as ‘areas of environmental concern’ is terminology used by DCM as specially designated areas not occurring in this project’s study area.”

**Response:** The use of the term “areas of environmental concern” in Section 4.6.2 of the DEIS has been revised in this FEIS.

**Comment:** “A list of federal, state, and local agencies indicates with an asterisk (\*) which agencies provided comments to the project scoping letter. DCM is not indicated as having provided scoping comments. It should be noted that DCM provided scoping comments in response to the request for comments from the NC State Clearinghouse for Intergovernmental Review. Those comments are attached to this document and should be included in the Final EIS.”

**Response:** NCDOT’s 2005 scoping comments are included in Appendix B of this FEIS.

***North Carolina Department of Environment and Natural Resources – Division of Water Quality [Now Division of Water Resources]– October 13, 2011***

**Comment:** “Review of the project reveals the presence of surface waters classified as SA: High Quality Waters of the State in the project study area. This is one of the highest classifications for water quality. Pursuant to 15A NCAC 2H.1006 and 15A NCAC 2B.0224, NCDOT will be required to obtain a State Stormwater Permit prior to construction except in North Carolina’s twenty coastal counties.”

**Response:** Comment acknowledged.

**Comment:** “Review of the project reveals the presence of surface waters classified as SA: Outstanding Resource Waters of the State in the project study area. The water quality classification of SA: ORW is one of the highest classifications in the State. The NCDWQ is extremely concerned with any impacts that may occur to streams with this classification. It is preferred that these resources be avoided if at all possible. If it is not possible to avoid these resources, the impacts should be minimized to the greatest extent possible. Given the potential for impacts to these resources during the project implementation, NCDWQ requests that NCDOT strictly adhere to North Carolina regulations entitled ‘Design Standards in Sensitive Watersheds’ (15A NCAC 04B.0124) throughout design and construction of the project. Pursuant to 15A NCAC 2H.1004 and 15A NCAC 2B.0224.”

**Response:** Five streams within one mile downstream of the study area have been designated HQW and one stream has been designated an ORW by NCDWR. All tributaries of these streams within the study area are identified in Section 3.5.3.2.1 of

the DEIS and this FEIS and are designated as HQW or ORW due to the classification of their receiving waters. As discussed in Section 4.7.1.7 and the “Project Commitments” section of this FEIS, if impacts to these streams cannot be avoided, Design Standards in Sensitive Watersheds will be implemented for these streams during project construction.

**Comment:** “It is stated that there are no waters in the project area that are listed on the 303(d) list. However, it is not stated from which 303(d) list this information was derived. This should be based on the most recent list, which would be from 2010. The 2010 303(d) list has all waters in the state listed as impaired based on a statewide fish consumption advisory due to elevated mercury levels. If the 2010 list was not used, there may be other listings that are not included in the document; this information should be verified.”

**Response:** Section 3.5.3.2.1 of this FEIS has been updated to indicate there are no streams within one mile downstream of the study area included in the North Carolina 2012 Final 303(d) list due to sedimentation or turbidity.

**Comment:** “Section 3.1 (Human Environment) makes reference to a Qualitative Indirect and Cumulative Effects Assessment dated June 2009. The NCDWQ has not had a chance to review this information and requests a copy of the Assessment.”

**Response:** The June 2009 Community Impact Assessment and Qualitative Indirect and Cumulative Effects Assessment was sent to NCDWR on June 2, 2014. Baseline watershed data included in DEIS Table 4-20 and FEIS Table 4-22 was developed in coordination with USACE after the completion of the Indirect and Cumulative Effects Assessment. Subsequent to the release of the SDEIS, an updated Indirect and Cumulative Effects (ICE) Analysis, including an Indirect and Cumulative Effects Screening Report and Land Use Scenario Assessment (September 2013), was completed for the proposed project. The results of the updated ICE assessment are included in Section 4.6 of this FEIS. A copy of this report was also provided to NCDWR on June 2, 2014.

**Comment:** “The NCDWQ encourages the NCDOT to investigate any potential for onsite mitigation to offset the impacts of the project.”

**Response:** NCDOT does not typically extensively investigate on-site mitigation opportunities until after the LEDPA has been chosen. Since the merger team concurred on NCDOT’s preferred alternative as the LEDPA at the May 17, 2012 CP 3 merger team meeting in accordance with the procedures detailed in the NEPA/ Section 404 Merger Process, NCDOT has investigated potential on-site wetland and stream mitigation sites in coordination with USACE. On-site mitigation will be used as much as possible; however, NCDOT’s memorandum of agreement with the NCDENR Ecosystem Enhancement Program limits on-site mitigation to sites adjacent and contiguous with the roadway corridor.

**Comment:** “The ‘Travel Demand Management’ (TDM) section concludes by stating that ‘TDM improvements would not add new lanes or provide alternative routes or means of travel to existing roadways.’ The Purpose Statement for the project does not specifically state that adding new lanes, providing alternative routes, or adding means of travel within the project area are the purpose of the project. With respect to TDM, the focus would be reducing traffic, especially during weekday peak travel times. With a reduction in traffic, the safety should increase on Market Street and the reduction in traffic would also reduce the need to increase the carrying capacity of the street. However, TDM is based on enough employers allowing such flexibility in work schedule combined with enough employees partaking of the flexibility. It is doubtful that the combination of the two would reduce traffic enough such that a noticeable decrease in crashes and traffic would occur.”

**Response:** Comment acknowledged.

**Comment:** “Appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.”

**Response:** During the Section 401 Water Quality Certification and Section 404 Permit application process, NCDOT will work with NCDWR and USACE to determine appropriate mitigation.

***North Carolina Department of Environment and Natural Resources – Division of Water Resources – Public Water Supply Section – September 9, 2011***

**Comment:** “...the purple proposed line goes through the well field for CFPUA/NHC water system, which contains 20 wells. This water system may lose the use of some of these wells depending on the actual location(s) of the road. Public water supply wells must have a 100’ radius that are owned or controlled by the system to allow use and must maintain access to the sites. Flooding of the sites is not allowed so please keep that in mind when designing roads near these sites.”

**Response:** Impacts to the CFPUA existing and planned wells and associated infrastructure are discussed in Sections 4.3.4 and 4.5.3.1.1 of the DEIS and this FEIS. Additional studies on the potential impacts of the proposed project on groundwater water supply resources and CFPUA infrastructure were conducted. In accordance with State regulations for public water supply wells (see FEIS Section 3.5.3.1.1), the Military Cutoff Road Extension alignment was modified since completion of the DEIS to be located a minimum of 100 feet away from existing wellheads.

**Comment:** “It also appears that maybe the road and noise barriers J3 & J4 might be located directly over an existing 10” potable transmission main and/or a 12” raw water transmission main. You might want to get an exact location from CFPUA.”

**Response:** Sections 4.3.4 and 4.5.3.1.1 of this FEIS provide updated information related to impacts to CFPUA infrastructure and further coordination with CFPUA. As part of this coordination, NCDOT obtained mapping showing the location of water lines from the CFPUA. Both Alternatives M1 and M2 would cross potable and raw water lines, but any impacted water lines would be relocated as part of the proposed project and returned to service. NCDOT will continue to coordinate with the CFPUA regarding the location of their infrastructure as design progresses.

**Comment:** “If existing water lines will be relocated during the construction, plans for the water line relocation must be submitted to the Division of Water Resources, Public Water Supply Section, Technical Services Branch, 1634 Mail Service Center, Raleigh, North Carolina 27699-1634, (919) 733-2321.”

**Response:** NCDOT will coordinate any plans for water line relocation with the Division of Water Resources, Public Water Supply Section.

***North Carolina Department of Environment and Natural Resources – Natural Heritage Program – October 19, 2011***

**Comment:** “This project likely will cause considerable environmental impacts to wetlands, wildlife habitat, rare species, and possible natural areas. Many of these impacts will likely be secondary, as a result of habitat fragmentation through placement of a limited access highway through undeveloped lands. It is unfortunate that our Program and perhaps most others in the Department, has not been contacted for Scoping comments: no such letters appear to be included in the document.”

**Response:** Impacts of the proposed project are evaluated in Chapter 4 of the DEIS and this FEIS. Section 5.1.2 of the DEIS and this FEIS notes scoping letters were sent in August 2005. Project scoping for NCDENR agencies and programs was coordinated through the NC Department of Administration’s State Clearinghouse.

**Comment:** “Enclosed are two maps showing the significant natural resources in the project area. The northern half of the project – from about a mile northeast of Sidbury road to the connection with US17 northeast of Hampstead – appears to avoid significant natural resources. The western of the two alignments (red on figure S-1), appears to better avoid Blake Savanna (green polygon north of Sidbury Road) and Sidbury Road Savanna (black polygon south of Sidbury Road). This red alternative also better avoids the NCDOT mitigation areas (maroon-brown polygons along the Wilmington Bypass), passing just to the west of them. The continuation of the red route south of Wilmington Bypass (blue line on figure S-1) also does a better job of avoiding natural resources than does the more eastern purple route on the figure. In summary, the most western of the combined routes appears to do the least impacts to significant heritage areas, rare species, and conservation areas.”

**Response:** NCDOT concurs that Alternative M1+E-H has among the lowest impacts to SNHAs, federally-protected species, and conservation areas.

**Comment:** “However, it is very important that the NCDOT continue to conduct Section 7 consultations with US Fish and Wildlife Service regarding potential impacts to Federally listed species such as the Red-cockaded Woodpecker (*Picoides borealis*), roughleaf loosestrife (*Lysimachia asperulifolia*), and Cooley’s meadowrue (*Thalictrum cooleyi*), as indicated in the DEIS.”

**Response:** As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species. USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act.

#### **North Carolina Wildlife Resources Commission – October 19, 2011**

**Comment:** “Impacts to the Corbett and Plantation Road mitigation sites, these sites and associate tracts provide compensatory mitigation as well as serve as conservation areas for sensitive plants species. Not only are direct impacts to these sites a concern, but also indirect impacts resulting from road and development proximity that may further limit the ability to manage these sites. Impacts to the areas should be avoided or further minimized.”

**Response:** Alternatives M1+E-H, M1+R, and M1+U are located within the existing right-of-way in the area of the Corbett Tract Mitigation Site. Impacts to the Corbett Tract Mitigation Site from these alternatives were calculated based on slope stake limits plus an additional 25 feet. The impacts reported for Alternatives M1+E-H, M1+R, and M1+U are within the “additional 25 feet”. Alternatives M2+O and M2+U do not impact the Corbett Tract Mitigation Site. As discussed in the “Project Commitments” section of this FEIS, NCDOT will further investigate ways to avoid impacts to the Corbett Tract Mitigation Site during detailed project design. If possible, no right-of-way will be acquired from this site.

Alternatives M1+E-H, M1+R, and M1+U are located within the existing right-of-way in the area of the Plantation Road Mitigation Site. Impacts to the Plantation Road Mitigation Site from these alternatives (see Table 4-9 of this FEIS) were calculated based on slope stake limits plus an additional 25 feet. The impacts reported for Alternatives M1+E-H, M1+R, and M1+U are within the “additional 25 feet”. The potential impacts to the Plantation Road Mitigation Site associated with Alternatives M2+O and M2+U are substantially greater. As discussed in the “Project Commitments” section of this FEIS, NCDOT will further investigate ways to avoid impacts to the Plantation Road Mitigation Site during detailed project design. If possible, no right-of-way will be acquired from this site.



**Comment:** “Direct impacts to Holly Shelter Game Land have been avoided; however indirect impacts as a result of constructing these improvements in close proximity to Holly Shelter may restrict the ability for WRC to manage portions of this area with prescribed burning, this issue is not mentioned in the indirect and cumulative effects section of the document.”

**Response:** NCDOT concurs direct impacts to Holly Shelter Game Land have been avoided. Right-of-way limits have been pulled back to maintain access to the current drive on existing US 17 and travel lanes on the segment of US 17 directly adjacent to the game land will be shifted to the east away from game land property. Construction activities are expected to be confined to the existing US 17 right-of-way adjacent to the game land. The indirect and cumulative effects discussion in Section 4.6 of this FEIS notes the proximity of US 17 Hampstead Bypass will need to be considered when determining if conditions for prescribed burning on the game lands are appropriate.

**Comment:** “Impacts to the Red-cockaded woodpecker (*Picoides borealis*) continue to be assessed; continued coordination should result in the further reduction of impacts to RCW habitat.”

**Response:** NCDOT is committed to the protection of RCWs and their habitat. As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species (i.e., RCW and rough-leaved loosestrife). USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act. It is anticipated that USACE will request of USFWS that formal consultation for RCW be initiated in accordance with Section 7 of the Endangered Species Act.

**Comment:** “Stream and wetland impacts with all remaining alternatives are significant; however we anticipate further avoidance and minimization of these resources.”

**Response:** NCDOT has coordinated with NCDWR and USACE to avoid and minimize impacts to wetlands and streams through Concurrence Points 2A (bridging decisions and alignment review) and 4A (avoidance and minimization). NCDOT will continue to work with these agencies through Concurrence Points 4B (review of conceptual drainage design with 30 percent hydraulic design) and 4C (review surface drainage design and permit drawings with 100 percent hydraulic design) and to obtain a Section 401 Water Quality Certification and a Section 404 Permit prior to project construction.

## 5.5.2 AGENCY COMMENTS ON THE SDEIS

### 5.5.2.1 FEDERAL AGENCIES

#### United States Department of the Interior, US Fish and Wildlife Service, Raleigh Field Office – January 7, 2014

**Comment:** “As you know, the Service has been actively involved for several years in early coordination on this project through the combined NEPA/404 Merger Process, and many of our previous comments and recommendations are reflected in the SDEIS.”

**Response:** Comment acknowledged.

**Comment:** “As stated in the SDEIS, the Service concurred with the selection of alternative M1+E-H as the Least Environmentally Damaging Practicable Alternative (LEDPA) selected on May 17, 2012. We supported M1+E-H as the LEDPA primarily because it has the least impacts to federally threatened and endangered species. Since the selection of the LEDPA, further refinements in the location and design of the northern interchange have occurred. With regard to the northern interchange, the Service supports the conclusions of the SDEIS. Specifically, we support the current reduced design of the northern interchange which minimizes adverse effects to the federally endangered red-cockaded woodpecker (RCW, *Picoides borealis*).”

**Response:** USFWS’s position that it supports the conclusions of the SDEIS with respect to the US 17 Hampstead Bypass northern interchange, specifically the current reduced design in order to minimize adverse effects to the federally-endangered red-cockaded woodpecker, is acknowledged.

**Comment:** “Despite substantial and successful efforts to minimize adverse effects to RCWs, it appears that the current project design would still likely require an unavoidable take of one active RCW group. This one RCW group is part of the Coastal North Carolina Primary Core Recovery Population within the Mid-Atlantic Coastal Plain Recovery Unit. Given the fact that the Coastal North Carolina Primary Core Population is still far from achieving its minimum size required for delisting (350 potential breeding groups), the loss of even one potential breeding group is significant. We continue to emphasize the serious nature of addressing the loss of this one group in the upcoming additional coordination that is referred to in the SDEIS.”

**Response:** NCDOT is committed to the protection of RCWs and their habitat. As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species (i.e., RCW and rough-leaved loosestrife). USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act. It is anticipated that USACE will request of USFWS that formal consultation for RCW be initiated in accordance with Section 7 of the Endangered Species Act.

**Comment:** “The Service acknowledges that, as a result of minimization of impacts to RCWs, additional impacts to wetlands will be incurred. Although the Service has a vested interest in conserving wetlands, we believe that it is justifiable to incur additional wetland impacts in order to reduce the level of take on RCWs down to just one group. In conjunction with NCDOT’s proposed acquisition and restoration of habitat adjacent to Holly Shelter Game Land, the current project design would likely not preclude Holly Shelter Game Land from reaching its RCW recovery goals in the long term. However, selecting an alternative with fewer wetland impacts but with a higher level of take of RCWs may preclude Holly Shelter from reaching its recovery goals and would weigh heavily in the Service’s jeopardy analysis in the upcoming formal Section 7 consultation. The Service would also object to the issuance of a Section 404 permit for an alternative with a take of more than one RCW group. We believe successful compensatory mitigation for wetland impacts is much easier to obtain than offsetting impacts to RCWs. Opportunities to offset impacts to RCWs are substantially fewer than opportunities to mitigate for wetlands. RCWs are a much more limited resource than are wetlands.”

**Response:** Comment acknowledged.

**Comment:** “In Section 5.6.4.3 the SDEIS states that the project likely will adversely affect the federally endangered rough-leaved loosestrife (*Lysimachia aesperrulaefolia*). While this may ultimately prove to be the case, the Service believes that refinements in final design could possibly avoid adverse effects to this species, thus avoiding formal Section 7 consultation for rough-leaved loosestrife. We will continue to provide input on this issue through the Merger Process.”

**Response:** Comment acknowledged.

**United States Environmental Protection Agency, Region 4 – December 16, 2013**

**Comment:** “In summary, EPA has continued environmental concerns (EC) for Alternative M1 for the Military Cutoff Road Extension portion of the project due to potential impacts to the wellhead protection area for the Nano Water Treatment facility. EPA recognizes the measures taken to avoid direct impacts to several of the wellheads by shifting the alignment for M1. However, the proposed project commitments for future coordination with the Cape Fear Public Utility Authority with respect to potential future contamination issues to the wellhead protection area resulting from a hazardous material spill should be strengthened. For the preferred alternative, M1+E-H with Option 6TR, substantial impacts remain to: jurisdictional wetlands and streams including ORW and HQW, historic resources, noise receptors, prime farmlands, endangered species, terrestrial forests, residences and businesses, cemeteries, the Pender County Recycling Center, the Topsail High wastewater treatment plant, and hazardous material sites. Therefore, for Alternative E-H and for Alternative M1+E-H with option 6TR we continue [to] have environmental objections. We request that the FEIS provide additional information on noise receptor impacts, prime farmland, endangered species,

compensatory mitigation for wetlands and streams. The inclusion of 5.2 miles of service roads to the preferred alternative should also be made clear to the Merger team prior to the issuance of the FEIS. See Attachment A for further discussions of issues that should be addressed in the FEIS and ROD.”

**Response:** Most of the issues discussed in the comment above were further expanded upon in Attachments A and B to USEPA’s letter, and NCDOT’s responses are included with the responses to the comments in the attachments.

As discussed in Section 5.6.3.1.1 of the SDEIS, in response to agency comments on the DEIS, additional studies on the potential impacts of the proposed project on groundwater water supply resources and CFPUA infrastructure were conducted. As a result of these additional studies, four commitments related to the protection of groundwater water supply resources and CFPUA infrastructure were included in the “Project Commitments” section of the SDEIS and are also included in this FEIS. Two of these commitments are related to avoiding and responding to potential future contamination issues to the wellhead protection area resulting from hazardous materials spills.

This FEIS provides additional information on impacts to prime farmland and endangered species, as well as information on compensatory mitigation for impacts to wetlands and streams. This FEIS also provides updated information on noise receptor impacts. As indicated in Section 4.3.1 of this FEIS, during final design impacted noise receptors for NCDOT’s preferred alternative, including the ten proposed service roads, will be evaluated and recommended noise barrier locations will be reviewed.

Proposed service road locations were discussed with the merger team at a Merger Informational meeting on January 22, 2014. At this meeting, NCDOT also requested input from the merger team on opportunities to avoid and minimize service road impacts. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension. The revised Avoidance and Minimization concurrence form for Military Cutoff Road Extension was signed on April 23, 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the impacts identified in this FEIS for NCDOT’s preferred alternative reflect the incorporation of the agreed upon avoidance and minimization measures for the service roads for both projects.

## Attachment A – Detailed Technical Comments, Supplemental Draft Environmental Impact Statement

### **Purpose of this Document**

**Comment:** “There are several statements in this section of Supplemental Draft Environmental Impact Statement (SDEIS) that should be clarified. On page 1-1, the SDEIS states: *“The Merger Team’s LEDPA decision involves the selection of a corridor, not a specific project design.”* The LEDPA decision is based upon the alternative’s impacts from the proposed project design within the corridor plus 25 feet for construction slope stakes. The corridor (typically 500 to 1,000 feet for new location multi-lane highways) preliminary impacts are utilized in the Merger process for Concurrence Point (CP) 2, selection of the Detailed Study Alternatives (DSAs). During the CP 4A meeting, EPA’s Merger Team representative clearly articulated this issue and that the NCDOT’s and USACE’s proposed changes to the LEDPA, including the addition of a new interchange and increasing from a 4-lane to a 6-lane facility, the need for additional right-of-way beyond what was shown at the LEDPA meeting, and the substantial increases to jurisdictional resources, required a re-assessment of the July 2011 DEIS. The NCDOT’s and USACE’s proposed design changes following the corridor/design public hearing were presented to the Merger team after the LEDPA had been selected by the Merger team agencies (Please refer to the 2005 Merger Guidance Manual, Process I – Projects on New Location, pages 11-12).”

**Response:** The statement referenced by USEPA on page 1-1 of the SDEIS is intended to point out that the merger team selects the LEDPA (preferred alternative) corridor based on the impacts for the preliminary designs of the DEIS detailed study alternatives (i.e., the most current information available at that time). However, it is recognized the preliminary design will continue to be refined within the preferred alternative corridor through final design to address comments from environmental agencies and the public, and to avoid and minimize impacts. One of the primary purposes of the SDEIS was to document the design changes to the US 17 Hampstead Bypass portion of NCDOT’s preferred alternative that have occurred since the release of the DEIS. NCDOT acknowledges the USEPA’s merger team representative’s concerns related to the increases in impacts to jurisdictional resources with the proposed design changes to the LEDPA presented in the SDEIS, as well as the representative’s request for a re-assessment of the July 2011 DEIS. However, as discussed in Section 4.5 of the SDEIS and Section 2.9 of this FEIS, despite the proposed design changes for Alternative M1+E-H presented in the SDEIS, the reasons for the merger team’s concurrence on Alternative M1+E-H as the LEDPA, as well as the selection of Alternative M1+E-H as NCDOT’s preferred alternative, remain valid. The primary reasons that the other DEIS detailed study alternatives (M2+O, M1+R, M1+U, and M2+U) were not selected are discussed on page 4-10 of the SDEIS, and the addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) did not affect these factors. In addition, as shown in Table 5 of the SDEIS, Option 6TR would result in similar changes in impacts to all of the DEIS detailed study

alternatives. It is not unusual for impacts to change between preliminary and final design because of many factors, including design revisions in response to public comments, changes in mapping, and the addition of hydraulic design. However, as discussed in the SDEIS and this FEIS, the merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by USACE as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."

**Comment:** "The SDEIS also 'presents information' related to potential service road locations currently under study for Military Cutoff road Extension and US 17 Hampstead Bypass. There are additional jurisdictional impacts associated with these proposed service roads that were not disclosed or addressed during the May 2012 LEDPA concurrence meeting. Some of these service road impacts are substantial, including the 2 service roads NCDOT and the USACE currently propose as being 'cost-effective': SR 1 and SR 4. SR 4 results in an additional 2.71 acres of wetland impacts, 1,170 linear feet of stream impacts, and 1.17 acres of terrestrial forest impacts. There is no rationale provided as why these 2 service roads are cost-effective while the other 12 service roads are not cost-effective. Section 4.4 of the SDEIS explains that potential service road locations could not be identified (*"In the case of this project, potential service road locations could not be identified and the service road studies conducted in time to discuss this information with the Merger team."*) but does not provide the appropriate reason 'why' this impact information was not available at the CP 4A meeting."

**Response:** In the case of this project, potential service road locations could not be identified and the service road studies conducted in time to discuss this information with the merger team at CP 4A, but NCDOT moved forward with conducting avoidance and minimization meetings to keep the project on schedule. As discussed in SDEIS Section 4.4 and Section 2.8.5 of this FEIS, NCDOT completed the service road study for Military Cutoff Road Extension prior to release of the SDEIS, and SR1 and SR4 were retained because they were determined to be cost effective (i.e., would decrease overall project costs). However, the service road study for the US 17 Hampstead Bypass was not completed prior to the release of the SDEIS, so it was not yet known which Bypass service roads were cost effective. As a result, all 12 of the potential service roads for the Bypass (SR5 through SR16) were retained for evaluation in the SDEIS. NCDOT completed the service road study for the US 17 Hampstead Bypass in January 2014. Based on the results of this study, four additional service roads (SR7, SR9, SR12, and SR15) were determined not cost

effective and it was discovered a fourth (SR6) may not be needed if NCDOT acquires a property for wetland mitigation.

The proposed service road locations were discussed with the merger team at a merger informational meeting on January 22, 2014. At this meeting, NCDOT also requested input from the merger team on opportunities to avoid and minimize service road impacts. The merger team agreed on the locations of, as well as avoidance and minimization measures for, the two proposed service roads for Military Cutoff Road Extension. The revised Avoidance and Minimization concurrence form for Military Cutoff Road Extension was signed on April 23, 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team also agreed on avoidance and minimization measures for SR6 for the US 17 Hampstead Bypass, but did not agree on the locations of all of the proposed service roads for the Bypass. As documented in the Project Commitments section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. Although formal concurrence has not been received for avoidance and minimization measures for the US 17 Hampstead Bypass service roads, the impacts identified in this FEIS for NCDOT's preferred alternative reflect the incorporation of the agreed upon avoidance and minimization measures for the service roads for both projects. In addition, the ten proposed service roads currently retained for both projects are further evaluated from an environmental standpoint in this FEIS.

**Comment:** “This section of the document refers the reader to Section 4.5 and the ‘Validity of Merger Team LEDPA Decision’. Table 5 in this section of the SDEIS provides a generalized table of impacts comparing the DEIS DSA. However, the second footnote of this table indicates that relocations (“displacements”) were calculated to reflect changes associated with the northern interchange Option 6TR only. It also states that changes in impacts as a result of avoidance and minimization measures elsewhere along the project are not included in the table. There is no rationale why this method of comparing impacts was performed in this manner. Moreover, as stated: “*The table shows an increase or decrease in impacts to environmental features for the detailed study alternatives with Option 6TR incorporated into the design of each alternative*”. This assessment method of comparing the LEDPA to the other DSAs with the inclusion of the additional interchange and 6-lanes into each of the other DSAs is potentially pre-decisional. Alternative U had other interchanges (5 between Futch Creek Road and Jenkins Road) in its design that could alter the traffic projections for north of Topsail High School.”

**Response:** The interchange north of the Topsail Schools complex restores access to existing US 17. NCDOT investigated ways to restore this access in response to public demand stemming from their review of the detailed study alternatives at the October 2011 Corridor Public Hearings. Options to restore this access were being evaluated prior to the selection of the LEDPA. As such, the options under evaluation were intended to work with any of the detailed study alternatives. All of the detailed study alternatives follow the same alignment at the northern end of the

project. The merger team was made aware at the CP 3 informational meeting in December 2011 and at the CP 3 meeting in May 2012 that NCDOT was in the process of evaluating options to address the access issue. It was specifically noted at the CP 3 informational meeting any design changes related to restoring access to existing US 17 would affect all of the detailed study alternatives in the same way since all alternatives have the same design at the northern tie-in.

As stated in SDEIS Section 4.5 (page 4-9), the purpose of SDEIS Table 5 is to show that the addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) would result in similar changes in impacts to all of the DEIS detailed study alternatives. The Table 5 footnote (indicating changes in impacts as a result of avoidance and minimization measures are not included in the table) should have been on its own line and not associated with footnote 2. This footnote was intended to reinforce the reader's understanding of the basis for the numbers reported in the table.

**Comment:** "Section 4.5 also states that the changes now proposed for DSA M1+E-H with Option 6TR does not invalidate the Merger Team's concurrence on that alternative as LEDPA. This claim is not supported by the 2005 Merger Guidance Manual, Concept of Concurrence, on page 2, where a re-evaluation of concurrence might include a 'discovery of an impact, resource, or additional information that was not previously identified or did not previously exist'. Section 4.5 also states: *".... that the final decision on LEDPA will not be made until after the USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project."* The statement on Page 4-5 concerning the final selection by the USACE of either M1+E-H with Option 6TR or the original M1+E-H as the future permitted LEDPA should be clarified in the FEIS."

**Response:** As shown in Table 5 of the SDEIS, the proposed additional northern interchange (Option 6TR) would result in similar changes in impacts to all of the DEIS detailed study alternatives, including NCDOT's preferred alternative. Therefore, as discussed in Section 4.5 of the SDEIS, despite the proposed design changes, the reasons for the merger team's concurrence on Alternative M1+E-H as the LEDPA, as well as the selection of Alternative M1+E-H as NCDOT's preferred alternative, remain valid. The primary reasons that the other DEIS detailed study alternatives (M2+O, M1+R, M1+U, and M2+U) were not selected are discussed on page 4-10 of the SDEIS, and the addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) did not affect these factors. However, as discussed in the SDEIS and this FEIS, the merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by USACE as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed



project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."

The history of the location and design of the northern interchange for the US 17 Hampstead Bypass was discussed in detail in SDEIS Section 4.1, and is also discussed in Section 2.8.1 of this FEIS. As indicated on page 4-5 of the SDEIS, if RCW foraging habitat ceases to exist at the northern interchange at the time NCDOT applies for authorization from USACE to construct the project, NCDOT will revisit the original northern interchange design (Alternative E-H ORIG) because it would further minimize wetland impacts compared to Alternative M1+E-H, Option 6TR (Preferred). This was included as a Project Commitment in the SDEIS (see page 1 of 4 of the "Green Sheets"), and is also included as a commitment in this FEIS.

### **Changes to the DEIS Impacts**

#### **Jurisdictional Wetlands and Streams**

**Comment:** "Table S-1 includes the comparison of DSA M1+E-H with Option 6TR or the original M1+E-H from the DEIS. This table includes the avoidance and minimization efforts applied to the LEDPA (original M1+E-H). It should be noted that from the Merger team LEDPA decision, the impacts after avoidance and minimization actually increased for wetlands (248.15 acres vs. 246.05) and decreased for streams (22,379 linear feet vs. 24,531 linear feet). It should also be noted from Table S-1 that residential and business relocations significantly were reduced by avoidance and minimization measures from the DEIS M1+E-H LEDPA to the M1+E-H with Option 6TR (Preferred) alternative from 61 and 84 vs. 53 and 39, respectively."

**Response:** Comment acknowledged.

**Comment:** "Table S-1 also includes the additional impacts from 5.2 miles of service roads S1 and S4 resulting in additional impacts to jurisdictional resources. Wetland impacts increased 16.89 acres and stream impacts 1,343 linear feet. There are no residential or business relocations associated with the proposed service roads."

**Response:** The total service road impacts shown in Table S-1 of the SDEIS, such as the 16.89 acres of wetland impacts referred to in USEPA's comment, are not just for SR1 and SR4. As discussed in SDEIS Section 4.4, 14 potential service roads were retained for evaluation in the SDEIS, and their individual impacts are shown in Table 4. The total service road impacts shown in Table S-1 were determined by adding the individual impacts shown in Table 4. NCDOT completed the service road study for the Military Cutoff Road Extension prior to release of the SDEIS, and SR1 and SR4 were retained because they were determined to be cost effective (i.e., would decrease overall project costs). However, the service road study for the US 17 Hampstead

Bypass was not completed prior to the release of the SDEIS, so it was not yet known which Bypass service roads were cost effective. As a result, all 12 of the potential service roads for the Bypass (SR5 through SR16) were retained for evaluation in the SDEIS.

**Comment:** “For the total project as proposed, wetland impacts are now estimated at 265.04 acres for 17.82 miles of multi-lane highways and 5.2 miles of service roads. Stream impacts in total have increased from the LEDPA to 23,722 linear feet. Based upon Tier I Merger Performance Measure baseline data from 2004-2011, the current project’s preferred alternative has 11.52 acres of wetland impacts per mile or more than 4 times (400%) the accumulated baseline impact of 2.7 acres/mile for a New Location Eastern project. Similarly, the 23,722 linear feet of stream impacts or approximately 1,000 linear feet/mile is more than 3 times (300%) the typical Eastern Merger stream impact per mile of approximately 300 linear feet/mile. The 11.52 acres/mile of wetlands impact and the 1,000 linear feet/mile of stream impact represent one of the highest observed Eastern project jurisdictional impacts per mile for a roadway facility. The sufficiency of the effort to avoid and minimize these jurisdictional impacts needs to be further confirmed.”

**Response:** As described in Sections 2.8.2 and 4.5.4.1.1 of this document, a number of minimization measures have been implemented for this project, including the realignment of approximately 5.8 miles of the 14.3-mile Hampstead Bypass to reduce wetland and stream impacts.

**Comment:** “The proposed project impacts Outstanding Resource Waters (ORW) including tributaries to Howe Creek designated by NCDOT as BDITCH1. Old Topsail Creek and Nixon’s Creek are designated Commercial Shellfishing/High Quality Waters (SA; HQW). Tributaries to these streams include those designated by NCDOT as NSA, NSF, NDITCH1 and ZTRIB1. The SDEIS does not quantify the impacts to ORW or SA/HQW or describe how impacts to these aquatic resources were avoided and minimized.”

**Response:** There are multiple tables in the SDEIS that quantify the impacts to ORW, HQW, and WS protected or critical areas (i.e., high quality waters watershed). Table S-1, Table 6, and Table 13 include comparisons of the impacts to these features as presented in the DEIS for Alternative M1+E-H (9.60 acres) to the impacts for NCDOT’s preferred alternative and potential service roads (20.72 acres). Table 4 summarizes the individual service road impacts to these features. Table 2 compares the total impacts of the DEIS detailed study alternatives to these features as presented at the May 2012 LEDPA meeting. Finally, Table 5 compares the change in impacts to these features for the DEIS detailed study alternatives with Option 6TR incorporated into the design of each alternative. As stated in SDEIS Section 3.4, avoidance and minimization measures incorporated into the proposed project since the selection of NCDOT’s preferred alternative, including those to these aquatic resources, are documented on the NEPA/Section 404 concurrence forms located in Appendix C. Additional avoidance and minimization measures to

be evaluated for the proposed project, including those to these aquatic resources, also are identified on the concurrence forms and documented in the Project Commitments included in the SDEIS and this FEIS.

**Comment:** “A conceptual compensatory mitigation plan for unavoidable impacts to jurisdictional waters is not provided in the SDEIS. Similar information from the DEIS is included on page 5-20 of the SDEIS (i.e., On-site mitigation opportunities being investigated by the NCDOT and the balance of impacts will be requested through the NC Ecosystem Enhancement Program – NCEEP). Considering the magnitude and intensity of the jurisdictional impacts (i.e., approximately 265 acres and 23,722 linear feet), the FEIS should provide a mitigation plan for the proposed project that is compliant with the 2008 final mitigation rule.”

**Response:** As discussed in Section 4.5.4.1.2 of this FEIS, NCDOT is investigating potential on-site stream and wetland mitigation opportunities for its preferred alternative sites in coordination with USACE. On-site mitigation will be used as much as possible. As discussed in Section 4.5.4.1.2 of this FEIS, off-site mitigation needed to satisfy the federal Clean Water Act requirements for this project will be provided by the NCDENR Ecosystem Enhancement Program in accordance with the “North Carolina Department of Environment and Natural Resources’ Ecosystem Enhancement Program In-Lieu Fee Instrument”, dated July 28, 2010. The USACE operates under guidance in the form of the mitigation rule (33 CFR 332) which speaks to the preferred method of compensatory mitigation. Any decision regarding an approved mitigation plan would come at the time of permit processing. During the Section 401 Water Quality Certification and Section 404 Permit application process, NCDOT will work with NCDWR and USACE to determine appropriate mitigation for the preferred alternative.

#### Other Natural Resource Impacts

**Comment:** “The original M1+E-H alternative in the DEIS included 9.6 acres of impact to High Quality Waters Watershed (HQW, ORW, WS or Critical Areas). The M1+E-H with Option 6TR (Preferred) and service roads the impact has more than doubled at 20.72 acres of impact. Similarly, 100-Year Floodplain and Floodway impacts went from 11.73 acres from the DEIS (and LEDPA) to 28.69 acres for the M1+E-H with Option 6TR (more than double). The Preferred M1+E-H with Option 6TR with service roads increased the 100-Year Floodplain and Floodway impacts to 33.08 acres. Table S-1 in the SDEIS does not provide a breakdown of the 20.09 acres of impacts to HQW, ORW or Water Supply protected or critical areas.”

**Response:** As discussed in Section 5.6.3.2.1 of the SDEIS (page 5-17), the increase in impacts shown in SDEIS Table S-1 for NCDOT’s preferred alternative including service roads (20.72 acres) in comparison to DEIS Alternative M1+E-H (9.60 acres) is a result of the third lane added in each direction between the two northernmost interchanges on the US 17 Hampstead Bypass under Option 6TR. As shown on SDEIS Figure 2G, this area is located within a HQW watershed, so an additional 10.9

acres would be impacted with all of the DEIS detailed study alternatives (see SDEIS Table 5). As discussed in Section 5.4.7 of the SDEIS (page 5-10), the increase in floodplain impacts shown in SDEIS Table S-1 for the preferred alternative including service roads (33.08 acres) in comparison to DEIS Alternative M1+E-H (11.73 acres) is largely a result of updated floodplain mapping from the North Carolina Flood Maps Data Service that became available since the release of the DEIS. The new data shows an increase in reported floodplain impacts for Alternative M1+E-H from 11.73 acres to 28.69 acres (see SDEIS Table S-1), an increase of 16.96 acres. However, the design changes to the proposed project as described in the SDEIS (i.e., Option 6TR) accounted for 1.2 acres of the total impacted area, as shown in SDEIS Table 5. The service roads account for an additional 4.39 acres of the increase in floodplain impacts, all of which is attributable to SR14 and SR16 (see SDEIS Table 4). No new major hydraulic crossings are proposed.

**Comment:** “Terrestrial forest impacts increased from the DEIS from 512.12 acres to 521.59 acres for the preferred M1+E-H with Option 6TR alternative. The service roads will contribute an additional 31.39 acres to total 552.98 acres (0.84 of a square mile) for M1+E-H with Option 6TR with service roads.”

**Response:** As shown in SDEIS Table S-1, USEPA is correct that the forest impacts for NCDOT’s preferred alternative (521.59 acres) increased in comparison to Alternative M1+E-H from the DEIS (512.12 acres). As shown in SDEIS Table 5, this increase is mostly due to the design changes associated with Option 6TR, which increased forest impacts for Alternative M1+E-H by 8.62 acres. USEPA also is correct that the potential service roads identified in the SDEIS would have added an additional 31.39 acres of forest impacts, for a total of 552.98 acres. However, NCDOT completed the service road study for the US 17 Hampstead Bypass in January 2014 and, based on the results of this study, four additional service roads (SR7, SR9, SR12, and SR15) were determined to not be cost effective. The elimination of these four service road decreased service road forest impacts by 6.33 acres. In addition, revisions to the alignments of SR4 and SR6 as part of avoidance and minimization measures decreased service road forest impacts by an additional 1.22 acres. However, the alignment of SR10 also was revised since the SDEIS to make it cost effective, which increased forest impacts by 0.97 acre. As a result of these changes to the proposed service roads since the SDEIS, the total forest impact for the service roads is 24.81 acres, a decrease of 6.58 acres since the SDEIS.

**Comment:** “The preferred alternative M1+E-H with Option 6TR is anticipated to impact 4.41 acres of Natural Heritage Program Significant Natural Heritage Areas (NHP-SNHA) and Wetland Mitigation Sites that were created and preserved by the NCDOT to address compensatory mitigation needs for the I-140/US 17 Wilmington Bypass project. The impact was reduced by the transportation agencies from the DEIS stage by 0.02 acres.”

**Response:** Comment acknowledged.

**Comment:** “The proposed project is expected to ‘take’ 1 cluster of the Federally-protected endangered species Red-Cockaded Woodpecker (RCW). The transportation agencies revised the original LEDPA design of the northern interchange to potentially avoid an additional RCW ‘take’ (Page 5-22). As stated in EPA’s letter on the DEIS, EPA defers to the USFWS (and NCWRC) on matters pertaining to Section 7 of the Endangered Species Act (ESA). EPA is requesting copies of the Biological Assessment and Biological Opinion upon their issuance for NEPA and Clean Water Act Section 404 documentation purposes.”

**Response:** USEPA will be provided copies of the Biological Assessment and Biological Opinion upon their issuance for NEPA and Clean Water Act Section 404 documentation purposes.

### Human Resource Impacts

**Comment:** “Residential and business relocations were significantly reduced by NCDOT and USACE avoidance and minimization measures from the DEIS M1+E-H LEDPA to the M1+E-H with Option 6TR (Preferred) alternative from 61 and 84 vs. 53 and 39, respectively. Residential relocations (displacements) were reduced by more than 13%. Business relocations have been reduced by more than 53%. EPA acknowledges that 4 non-profits were broken out from the DEIS business relocations to a separate category in Table S-1. EPA recognizes that these numbers are different than those presented in Table 2 of the SDEIS and was presented to the Merger team at the May 2012 LEDPA meeting. Table 2 shows that there were 64 residences, 76 businesses and 5 non-profits for M1+E-H (DEIS DSA and LEDPA). NCDOT and USACE may wish to discuss in the FEIS why similar avoidance and minimization efforts were not fully employed for other DSAs that were considered in the DEIS in comparison to the M1+E-H LEDPA and M1+E-H with Option 6TR alternative.”

**Response:** This reduction in relocations for NCDOT’s preferred alternative was achieved in part by reducing control of access along Market Street both north and south of the Military Cutoff Road Extension interchange to minimize impacts to properties on Market Street. Loops and ramps in the interchange also were tightened. It is expected that these design modifications alone would result in eight fewer residential relocations and 33 fewer business relocations. These design modifications also would have reduced residential and business displacements for the other DEIS detailed study alternatives by the same amount, but the relative difference in residential and business relocation impacts between the alternatives would not have changed. The reasons Alternative M1+E-H was selected as NCDOT’s preferred alternative are summarized starting on page 3-2 of the SDEIS. The Merger process calls for the selection of a LEDPA (preferred alternative) at Concurrence Point 3, followed by consideration by the merger team at Concurrence Point 4A of additional measures that could be incorporated into the preliminary design of the preferred alternative to further avoid and minimize impacts to the human and natural environment. However, in response to a request for additional information from the merger team, the table comparing the DEIS detailed study

alternatives at LEDPA was updated to include avoidance and minimization measures incorporated into Alternative M1 for Alternative M1+E-H, M1+R, and M1+U (see Table 2-12 of this FEIS). The merger team indicated it was not necessary to include the detailed study alternatives including Military Cutoff Road Extension Alternative M2 in the comparison.

**Comment:** “Table S-1 indicates that the LEDPA M1+E-H has 0 impacts to archeological sites. However, there is a note for M1+E-H option 6TR (Preferred), service roads and M1+E-H option 6TR with service roads that archeological surveys are underway and will not be completed or presented until the FEIS. However, Project Commitment #1, page 1 of 4 states that a National Register eligible archeological site was identified (31PD344\*\*) for M1+E-H option 6TR (Preferred) and that an MOU between the USACE, SHPO and NCDOT may be required outlining the mitigation measures for the adverse effect to the site. The information contained in the SDEIS is inconsistent and should be clearly presented and corrected in the FEIS. We defer to the SHPO if a Memorandum of Agreement (MOA) between the USACE, SHPO and NCDOT is required for this archeological site in order to address the mitigation measures.”

**Response:** SDEIS Table S-1 indicates that Alternative M1+E-H from the DEIS has zero impacts to archaeological sites, not “LEDPA M1+E-H” per USEPA’s comment. This is consistent with DEIS Table 2-3. At the time the SDEIS was released, the archaeological survey report had not been completed, so the State Historic Preservation Office (HPO) also had not reviewed the report. As stated in the SDEIS Project Commitment referred to by USEPA, preliminary analysis by the consultant conducting the archaeological survey suggested one of the archaeological sites identified (31PD344\*\*) will be recommended eligible for the National Register of Historic Places; however, this site could not be included in SDEIS Table S-1 as being impacted by NCDOT’s preferred alternative until the HPO concurred the recommended site is eligible for the National Register and it was determined that the site could not be avoided. As a result, SDEIS Table S-1 included a note indicating the results of the archaeological investigation will be included in the FEIS. As discussed in Section 3.4.2 of this FEIS, HPO concurred with the recommendation for National Register eligibility for this site in an October 15, 2013 memorandum (see copy in Appendix B). In addition, as discussed in Section 4.4.2 of this FEIS, it has been determined that DEIS Detailed Study Alternatives M1+E-H, M2+O, and M1+R, as well as the preferred alternative, would impact this site. HPO’s October 15, 2013 memorandum concurring on the eligibility of this site for the National Register also indicated that if this site cannot be avoided, further coordination would be required related to the development of a mitigation plan involving additional data recovery or avoidance. As a result, a Memorandum of Agreement will be prepared between USACE, HPO, and NCDOT outlining the mitigation measures for the preferred alternative’s adverse effect on this site. The SDEIS Project Commitment related to this archaeological site has been updated accordingly in this FEIS.

**Comment:** “The USACE is required to address compliance with Section 106 of the National Historic Preservation Act for the adverse effect on the National Register-eligible Mount Ararat AME Church (Pages S-6 and 5-12). An additional MOA between the USACE, SHPO and NCDOT is required outlining mitigation measures for the adverse effect. This unresolved Section 106 issue is not identified in the Project Commitments (‘Green Sheets’).”

**Response:** A commitment has been added to the “Project Commitments” section of the FEIS indicating a Memorandum of Agreement (MOA) will be prepared between the US Army Corps of Engineers, the State Historic Preservation Office, and NCDOT outlining mitigation measures for the adverse effect to Mount Ararat AME Church. The commitment indicates the US Army Corps of Engineers will serve as the lead federal agency with respect to compliance with Section 106.

**Comment:** “Noise receptor impacts have not been updated in the SDEIS. A note is contained in Table S-1 that impacted noise receptors will be evaluated in the final design for the project for M1+E-H option 6TR (Preferred), service roads and M1+E-H option 6TR with service roads. DEIS impacts showed 257 impacted noise receptors for M1+E-H (Tables S-1 and 2). A noise receptor impact comparison for the other DSAs was not conducted in the SDEIS.”

**Response:** USEPA is correct that the noise receptor impacts were not updated for the SDEIS. As indicated in Table S-1 of the SDEIS, during final design, impacted noise receptors for NCDOT’s preferred alternative will be evaluated in the Design Noise Study and recommended noise barrier locations will be reviewed. In addition, as indicated in Table 4 of the SDEIS, the DEIS Traffic Noise Technical Memorandum was not updated for the potential service roads. Noise receptors impacted by the service roads incorporated into the preferred alternative will be analyzed in the Design Noise Study and recommended noise barrier locations will be reviewed. USEPA also is correct that a noise receptor impact comparison for the other DEIS detailed study alternatives was not conducted in the SDEIS. Rather, the LEDPA meeting comparison of all impacts for the detailed study alternatives, including noise impacts, was provided in SDEIS Table 2. The intent of the SDEIS was not to update human and natural resource impact comparisons for the DEIS detailed study alternatives, but rather to document changes to the proposed US 17 Hampstead Bypass since the release of the DEIS (i.e., the additional northern interchange and the service roads).

**Comment:** “The proposed project is expected to impact the Topsail High School wastewater package treatment plant. In addition, the new project design for the northern interchange also impacts the Pender County Recycling Center adjacent to Topsail schools. The new design used reduced design criteria and avoided the water tower located along US 17 adjacent to the Topsail schools. The SDEIS does not indicate how impacts to either the wastewater package treatment plant or the Pender County Recycling Center will be mitigated for and the potential timing of any actions associated with these mitigation efforts. It is not clear in the SDEIS what comprises the 4 non-

profit relocations (Table 7) and if these impacted community facilities are included in this total for the M1+E-H option 6TR (preferred) Alternative.”

**Response:** As discussed in SDEIS Section 5.2.2 and Section 4.1.2 of this FEIS, NCDOT will coordinate with the Pender County School System regarding impacts to the wastewater treatment facility located at the northeast corner of the Topsail Schools complex resulting from the proposed project during the project’s right-of-way phase. This is also included as a Project Commitment in the SDEIS and this FEIS. Pender County plans to expand sewer services in the area of the schools; however, funding availability makes the timing of improvements uncertain. As discussed in Section 4.1.2 of this FEIS, NCDOT also will coordinate with Pender County regarding relocation of the recycling facility.

The four non-profit relocations shown in SDEIS Table 7 for NCDOT’s preferred alternative are included in the 84 business relocations for Alternative M1+E-H from the DEIS. These non-profit relocations are Ogden Volunteer Rescue, Enoch Chapel Church, St. Jude the Apostle Church, and Angel Food Ministries. As shown in SDEIS Table 2, Alternative M1+E-H had five non-profit relocations as of the May 2012 LEDPA meeting because all of the DEIS detailed study alternatives included Topsail Baptist Church as a non-profit relocation. However, the proposed project has been modified to provide access to both St. Jude the Apostle Church and Topsail Baptist Church with all of the DEIS detailed study alternatives, thereby also reducing the non-profit relocations for the preferred alternative. In addition, Angel Food Ministries is no longer in operation. The relocation reports for NCDOT’s preferred alternative have been updated for this FEIS based on the revised preliminary design for the preferred alternative (see Appendix E). Total anticipated residential, business, and non-profit organization displacements for the DEIS detailed study alternatives and NCDOT’s preferred alternative are shown in Table 4-1 of this FEIS. Impacts to three non-profits (Peoples Baptist Church, Pender EMS, and Mount Ararat AME Church’s cemetery) are anticipated with NCDOT’s preferred alternative.

**Comment:** “As with noise receptor impacts, the SDEIS did not provide an update to impacts to prime farmlands which for M1+E-H preferred from the DEIS was approximately 68 acres (The highest impact to prime farmlands of the alternatives considered under the LEDPA). As stated in Table S-1, prime farmland impacts will be updated in the FEIS for M1+E-H option 6TR (preferred). Impacts to prime farmlands from the proposed 5.2 miles of service roads are also not identified.”

**Response:** USEPA is correct that the farmland impacts were not updated for the SDEIS. As indicated in Table S-1 of the SDEIS, farmland impacts for NCDOT’s preferred alternative have been coordinated with the Natural Resources Conservation Service (NRCS) and are updated in Section 4.3.3 of this FEIS. The completed Farmland Conversion Impact Rating for Corridor Type Projects (CPA-106) forms from the NRCS for the revised preliminary design for the preferred alternative, including the proposed service roads, are included in Appendix B of this FEIS, along with the completed forms for the DEIS detailed study alternatives.



**Comment:** “The proposed preferred alternative (M1+E-H with option 6TR) includes impacts to 3 cemeteries and 5 potential UST/Hazardous material sites.”

**Response:** USEPA is correct that the SDEIS indicated NCDOT’s preferred alternative would impact three cemeteries and five potential UST/hazardous materials sites. Section 4.1.2 of this FEIS discusses the cemeteries impacted by the revised preliminary designs for the preferred alternative and the DEIS detailed study alternatives. However, with the addition of the Lendire Road improvements to the preferred alternative, it would now impact six potential hazardous materials sites. Section 4.3.5 of this FEIS discusses the six potential hazardous materials sites impacted by the revised preliminary design for the preferred alternative.

#### Other Outstanding Issues

**Comment:** “The SDEIS indicates that the issue of conservation areas in the project study are unchanged and refers the reader several sections in the DEIS, including the discussions concerning indirect and cumulative effects related to development in Section 4.6 of the DEIS. The NCDOT and USACE now propose a new interchange north of Topsail High School and in close proximity to Holly Shelter Gamelands and other large undeveloped tracts of wetlands and woodlands being utilized by RCW and other wildlife species. This proposed interchange also impacts approximately 20 acres of wetlands. Indirect impacts to water quality can be expected from highway runoff into adjacent remaining wetlands (e.g., PD-38, MWA). It is also contrary to numerous prior development activities in this area of coastal N.C. that a new interchange did not induce additional development in and around a new access point so close to an existing US highway. EPA requests that a full indirect and cumulative effects analysis be prepared for this proposed project and provided in the FEIS.”

**Response:** Subsequent to the release of the SDEIS, an updated Indirect and Cumulative Effects (ICE) Analysis, including an Indirect and Cumulative Effects Screening Report and Land Use Scenario Assessment (September 2013), was completed for the proposed project. The results of the updated ICE assessment are included in Section 4.6 of this FEIS. USEPA will be provided a copy of the quantitative water quality impacts analysis. This assessment will be performed prior to requesting the Section 401 Water Quality Certification from NCDWR, which is required before issuance of the Section 404 Permit by USACE.

**Comment:** “It is unclear from the SDEIS if the USACE supports the NCDOT’s M1+E-H option 6TR alternative (preferred) and if this alternative is considered to be the new LEDPA. EPA requests that the FEIS provide clarification regarding statements in the SDEIS that the original M1+E-H alternative will be the LEDPA if RCW foraging habitat ‘ceases to exist’ at the time of permitting. The FEIS should identify the LEDPA and the quantified impacts to all human and natural environment resources from the proposed project. The NCDOT proposes to issue a State Record of Decision (SROD) after the FEIS. EPA requests a copy of the State ROD upon its issuance.”

**Response:** USACE concurred on the selection of NCDOT's recommended preferred alternative (Alternative M1+E-H) as the LEDPA at the May 2012 Concurrence Point 3 merger team meeting. USACE also signed the SDEIS as the Lead Federal Agency under NEPA, thereby indicating it does not object to NCDOT's preferred alternative with the design changes discussed in the SDEIS. The purpose of the SDEIS was to document the design changes to the proposed US 17 Hampstead Bypass project that have occurred since the release of the DEIS. However, these design changes do not constitute the selection of a "new" LEDPA because the merger team's LEDPA decision involves selection of a corridor, not a specific project design. As discussed in Section 4.5 of the SDEIS, the addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) would result in similar changes in impacts to all of the alternatives studied in detail in the DEIS (also see SDEIS Table 5). Therefore, the changes now proposed for Alternative M1+E-H do not invalidate the NEPA/Section 404 merger team's concurrence on that alternative as the LEDPA for the project, or the selection of Alternative M1+E-H as NCDOT's preferred alternative. However, as discussed in the SDEIS and this FEIS, the merger team's concurrence on the LEDPA is separate and distinct from the LEDPA determination that will ultimately be made by USACE as part of the Section 404 permit process. Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As stated in USACE's regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is "neither an opponent nor a proponent of the applicant's proposal; therefore, the applicant's final proposal will be identified as the 'applicant's preferred alternative' in the final EIS."

As indicated on page 4-5 of the SDEIS, if RCW foraging habitat ceases to exist at the northern interchange at the time NCDOT applies for authorization from the USACE to construct the project, the Department will revisit the original interchange design, known as Alternative E-H ORIG. This does not represent a change in the selected corridor for the project, but only a potential change in the design of two interchanges on Alternative E-H.

This FEIS fully describes the current preliminary design of the LEDPA (NCDOT's preferred alternative) concurred on by the merger team at the May 2012 Concurrence Point 3 meeting. It also describes and quantifies impacts to all human and natural environment resources from the proposed project. USEPA will be provided a copy of the State ROD upon its issuance.

## **Attachment B – Summary of EPA’s Merger Process Issues, Supplemental Draft Environmental Impact Statement**

**Comment:** “As a Partnering Agency to the 2005 NCDOT/USACE/FHWA/NCDENR NEPA/Section 404 Merger Process Memorandum of Understanding (MOU), EPA has been an active participant in the multi-agency, collaborative process. EPA’s Merger Team representative conditionally concurred on the LEDPA (M1) for U-4751 due to potential direct impacts to the Cape Fear Public Utility Authority’s wellheads and after assurances was provided that these impacts could be avoided. EPA did not concur on Alternative E-H as the LEDPA for R-3300. EPA has further abstained on CP 4A, avoidance and minimization for R-3300 (The EPA abstention briefs are included in the appendix to the SDEIS). Furthermore, many of EPA’s detailed comments on the DEIS were not addressed in CP 4A meetings or the SDEIS and are being deferred to the FEIS.”

**Response:** NCDOT responded to USEPA’s detailed comments on the DEIS separately in a March 1, 2012 letter to Heinz J. Mueller, Chief, NEPA Program Office for USEPA Region 4. USEPA’s detailed comments on the DEIS are included in Section 5.5.1.1 of this FEIS. NCDOT’s March 1, 2012 responses, updated with current information where applicable, are also included in Section 5.5.1.1 of this FEIS. In a March 5, 2012 e-mail to NCDOT, USEPA’s merger team representative acknowledged reviewing NCDOT’s responses and indicated that USEPA did not plan a written response at that time.

**Comment:** “EPA’s Merger team representative has continued concerns over the NEPA/Section 404 Merger team process and the opportunities to problem-solve as a team and fully evaluate detailed environmental issues (e.g., the location of all residential and business relocations for DSA U and the specific design assumptions being used for that alternative). These concerns have become much clearer since NCDOT was able to avoid 13% and 59% of the residential and business relocations, respectively, following the LEDPA meeting for alternative M1+E-H. These concerns are further highlighted by the recent meeting scheduled with the NCEEP concerning compensatory mitigation but that the NCDOT has refused to schedule a follow-up meeting that fully assesses the LEDPA M1+E-H compared to M1+E-H option 6TR with service roads and other DSAs (e.g., Alternative U) that were eliminated as the LEDPA. Currently accepted ‘CP 4A’ measures such as 3:1 side slopes in jurisdictional areas is expected by the EPA Merger team representative to be brought back for revisions in the future due to NCDOT’s ultimate desire to raise the grade of the new multi-lane facility by 4 to 6 feet and avoid the use of reportedly ‘unsafe’ guardrails. This ‘late’ process issue has come up after CP 4A on numerous coastal highway projects in the last several years. Ultimately, the USACE and other Merger team agencies (except EPA) have agreed to these post-CP 4A design changes and it has resulted in additional wetland and stream impacts.”

**Response:** Similar information regarding relocations and design assumptions was presented for all of the detailed study alternatives in the DEIS.

The merger process calls for the merger team to work together to select a LEDPA (preferred alternative) at Concurrence Point 3 based on an “apples to apples” comparison of the DEIS detailed study alternatives, followed by consideration by the Team at Concurrence Point 4A of additional measures that could be incorporated into the preliminary design of the preferred alternative to further avoid and minimize impacts to the human and natural environment.

**Comment:** “The USACE is a project proponent and has signed the DEIS and SDEIS as the Lead Federal Agency under NEPA. The USACE is also the Merger Team Project Leader and the primary Federal permitting agency. The USACE has signed the LEDPA concurrence form and had the Merger team signatures on the LEDPA prior to the discovery of a new interchange, constructing a 6-lane facility instead of 4 lanes, and the need for additional service roads. All of these potential changes to the original M1+E-H alternative resulted in additional and substantial jurisdictional impacts. For this reason, EPA’s Merger Team representative abstained on CP 4A and requested that a SDEIS be considered by the transportation agencies. The final LEDPA selection process should be clarified in light of the statement on Page 4-5 concerning the selection by the USACE of either M1+E-H with Option 6TR or the original M1+E-H as the future permitted LEDPA.”

**Response:** As stated in USACE’s regulations at 33 CFR 325, Appendix B (*NEPA Implementation, Procedures for the Regulatory Program*), Number 9(5), USACE is “neither an opponent nor a proponent of the applicant’s proposal...”

The purpose of the SDEIS was to document the changes to the proposed project that have occurred since the release of the DEIS, including the design changes mentioned by USEPA in its comment. The SDEIS also presented new information and conditions relevant to environmental concerns resulting in additional impacts not evaluated in the DEIS, as well as information related to potential service road locations under evaluation for the proposed project. As discussed in Section 4.5 of the SDEIS, the addition of an interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass (Option 6TR) would result in similar changes in impacts to all of the alternatives studied in detail in the DEIS (also see SDEIS Table 5). Therefore, the changes now proposed for Alternative M1+E-H do not invalidate the NEPA/Section 404 merger team’s concurrence on that alternative as the LEDPA for the project in accordance with the procedures detailed in the NEPA/Section 404 Merger Process, or the selection of Alternative M1+E-H as NCDOT’s preferred alternative. The merger team’s LEDPA decision involves selection of a corridor, not a specific project design.

Although the merger team concurred on Alternative M1+E-H as the LEDPA for purposes of the merger process, USACE is not bound by that determination. USACE will not make their LEDPA determination until after USACE has applied the Section 404(b)(1) guidelines to a submitted permit application and completed the public interest review process for the proposed project (see Section 6.3 of the SDEIS and Section 5.3 of this FEIS). As indicated on page 4-5 of the SDEIS, if RCW

foraging habitat ceases to exist at the northern interchange at the time NCDOT applies for authorization from USACE to construct the project, the Department will revisit the original interchange design, known as Alternative E-H ORIG. The results of that study will be considered by USACE in making their LEDPA determination.

**Comment:** “There are also unresolved issues concerning endangered species and EPA is requesting that the Merger team be kept informed as to the potential resolution of issues concerning the RCW and other Federally-protected species.”

**Response:** As discussed in the “Project Commitments” section of this FEIS, as well as Sections S.9 and 4.5.4.3, NCDOT will continue to coordinate with USFWS regarding potential effects from its preferred alternative on federally-protected species (i.e., RCW and rough-leaved loosestrife). USACE will serve as the lead federal agency with respect to compliance with Section 7 of the Endangered Species Act. It is anticipated USACE will request of USFWS that formal consultation regarding the effects of the preferred alternative on RCW and rough-leaved loosestrife be initiated in accordance with Section 7 of the Endangered Species Act. The merger team will be kept informed as to the potential resolution of issues concerning these Federally-protected species.

#### **5.5.2.2 STATE AGENCIES**

##### **North Carolina Department of Agriculture and Consumer Services – Agricultural Services – December 5, 2013**

**Comment:** “The proposed route options for the Military Cutoff extension and US-17 Bypass construction in New Hanover County have the potential of irreversible damage and increases the loss of state important farm and forest land in the immediate area. The NCDOT is encouraged to give due consideration of routing and/or designs that would reduce the potential of negative environmental and economic impacts on farm and forest land in the proposed work area and choose a route that limits these damages. Construction of the Military Cutoff extension and US-17 Bypass should preference designs that reduce potential negative impacts on farms and forest land. These plans should also negate the formation of incompatible and inaccessible land units that degrades agricultural production capabilities associated with the areas farm and agribusinesses. The DOT selected alternative appears to impact the greatest amount of forest land and agricultural land of any of the proposed alternatives.”

**Response:** Impacts of the detailed study alternatives to forest and areas with prime and unique farmland soils are considered in the DEIS. Forest and farm lands were among the human and natural environment features considered in the selection of the Least Environmentally Damaging Practicable Alternative (LEDPA) and NCDOT’s preferred alternative. NCDOT will continue to evaluate opportunities to minimize impacts through the final design and permitting phases of the proposed project. NCDOT has coordinated with the US Department of Agriculture, Natural Resources Conservation Service (NRCS) on project impacts to prime and unique

farmland. Form CPA-106, *Farmland Conversion Impact Rating for Corridor Type Projects Form*, was submitted to the NRCS for the DEIS detailed study alternatives and updated for the preferred alternative (see Appendix B). Pender and New Hanover County are considered separately. The Land Evaluation and Site Assessment rating for the portion of the preferred alternative within New Hanover County is 79 (out of the possible 260 points). The combined rating for the portion of the preferred alternative within Pender County is 100. The assessment for the preferred alternative did not result in a total site assessment score greater than 160 points in either county.

**Comment:** “Agricultural production incomes from locally grown products have a considerable multiplier influence. It is estimated that for every 40 acres converted from agricultural production, one agribusiness job and its associated economic activity is lost indefinitely. Furthermore the costs of community services used by agribusiness are usually minimal and therefore are net contributors to county budgets. Both current and future cost for the conversion land from production agriculture is needed for an accurate evaluation which is not accurately recognized by the Farmland Conversion Impact Rating using Form AD 1006. **Based on the secondary, cumulative, and direct impacts, this project has potential to adversely impact the agricultural environmental and economic resources.** The total negative impact on the environmental and agribusiness economy will be proportionately related to the total acres of farm and forest land taken out of production.”

**Response:** As shown on DEIS Figure 15, almost all of New Hanover County within the project study area is zoned for development. Much of Pender County within the corridors for the DEIS detailed study alternatives and NCDOT’s preferred alternative also is zoned for planned development. As shown on DEIS Figure 15, the proposed interchange at existing US 17 where DEIS Detailed Study Alternatives M1+U and M2+U extend on new location is in a relatively large portion of southern Pender County that is zoned as “Agriculture.” Although all of the corridors for the DEIS detailed study alternatives and the preferred alternative cross this portion of Pender County, this is the only interchange proposed within this area. Avoidance and minimization to all natural and human environment resources, including farm and forest lands, will be considered through final design and permitting of the preferred alternative.

**North Carolina Department of Crime Control and Public Safety – Division of Emergency Management – Floodplain Management Program – December 5, 2013**

**Comment:** “No comment.”

**Response:** Comment acknowledged.

**North Carolina Department of Environment and Natural Resources – Division of Coastal Management – December 4, 2013**

**Comment:** “The purpose of the Supplemental Draft Environmental Impact Statement is to document changes to the proposed project that have occurred since the release of the Draft Environmental Impact Statement, dated July 2011. Those changes were brought about by citizens’ concerns during the corridor public hearings for the project. The changes include the construction of an additional interchange and an additional lane in each direction at the northern end of the US 17 Hampstead Bypass. This alternative, M1+E-H Option 6TR, is intended to address traffic capacity associated with the Topsail School complex and is NCDOT’s preferred alternative. DCM does not object to consideration of Option 6TR.”

**Response:** NCDOT’s position that it does not object to the consideration of Alternative M1+E-H with Option 6TR is acknowledged.

**Comment:** “As a member of the NEPA/Section 404 Merger Team, DCM concurred on Concurrence Point CP 3, Least Environmentally Damaging Practicable Alternative (LEDPA), on May 17, 2012, as well as the Concurrence Point CP 4a, Avoidance and Minimization, for the proposed Military Cutoff Road Extension, U-4751, on July 19, 2012 and CP 4a, for the US 17 Hampstead Bypass, R-3300, on June 13, 2013. DCM will continue to be an active participant on the Merger Team.”

**Response:** Comment acknowledged.

**Comment:** “As stated in DCM’s comments on the Draft Environmental Impact Statement, the proposed project will not impact a Coastal Area Management Act (CAMA) Area of Environmental Concern (AEC) as defined by the rules of the NC Coastal Resources Commission. Therefore, the proposed project will not require a CAMA Permit. However, in accordance with the provisions of Federal Consistency under the Federal Coastal Zone Management Act and the associated regulations, 15 CFR 930, the applicant (NCDOT) is required to evaluate the proposed project and certify to DCM and US Army Corps of Engineers (USACE) that the project is consistent with the NC Coastal Management Program.”

**Response:** As discussed in Section 4.5.4.6 of this FEIS, during the Section 404 Permit application process, NCDOT will request a Consistency Certification from NCDOT that the proposed project complies with the enforceable policies of the NC Coastal Management Program.

**North Carolina Department of Environment and Natural Resources – Division of Water Resources – December 4, 2013**

**Comment:** “Review of the project reveals the presence of surface waters classified as SA; High Quality Waters of the State in the project study area. This is one of the highest classifications for water quality. Provided the project meets the requirements of NCDOT NPDES permit NCS000250, no application for individual State Stormwater permit will be required (*Streamlining State Stormwater Permitting for NCDOT Projects* letter, July 26, 2013). Review of the project reveals the presence of surface waters classified as SA; Outstanding Resource Waters of the State in the project study area. The water quality classification of SA; ORW is one of the highest classifications in the State. The NCDWR is extremely concerned with any impacts that may occur to streams with this classification. It is preferred that these resources be avoided if at all possible. If it is not possible to avoid these resources, the impacts should be minimized to the greatest extent possible. Given the potential for impacts to these resources during the project implementation, the NCDWR requests that the NCDOT strictly adhere to North Carolina regulations entitled “Design Standards in Sensitive Watersheds” (15A NCAC 04B.0124) throughout design and construction of the project. Provided the project meets the requirements of NCDOT NPDES permit NCS000250, no application for individual State Stormwater permit will be required (*Streamlining State Stormwater Permitting for NCDOT Projects* letter, July 26, 2013).”

**Response:** Five streams within one mile downstream of the study area have been designated HQW and one stream has been designated an ORW by NCDWR. All tributaries of these streams within the study area are identified in Section 3.5.3.2.1 of the DEIS and this FEIS and are designated as HQW or ORW due to the classification of their receiving waters. As discussed in Section 4.7.1.7 and the “Project Commitments” section of this FEIS, if impacts to these streams cannot be avoided, Design Standards in Sensitive Watersheds will be implemented for these streams during project construction.

**Comment:** “Section 5.7 (Indirect and Cumulative Effects) makes reference to an updated Indirect and Cumulative Effects Analysis being prepared. The NCDWR request that the proposed service roads noted in the supplement be included in the analysis and that NCDWR is provided a copy of this report when completed.”

**Response:** An updated Indirect and Cumulative Effects Analysis, including an Indirect and Cumulative Effects (ICE) Screening Report and Land Use Scenario Assessment (LUSA), was completed for the proposed project in September 2013. A summary of the information included in the report can be found in Section 4.6 of this FEIS. The September 2013 ICE/LUSA report was provided to NCDWR on June 2, 2014.

**Comment:** “It is stated in the DEIS dated July, 2011 that there are no waters in the project area that are listed on the 303(d) list. NCDWR comments on the DEIS dated October 13, 2011 notes that it was not stated from which 303(d) list the information was



derived and that the information should be based on the most recent list which would be from 2010. This concern was not addressed in the supplement. The 2010 303(d) list has all waters in the state listed as impaired based on statewide fish consumption advisory due to elevated mercury level and there may be other listings that are not included in the document if the information in the DEIS was obtain from an older list. The FEIS should address the absence or presence of 303(d) waters within the project area based on the most recent list.”

**Response:** Section 3.5.3.2.1 of this FEIS has been updated to indicate there are no streams within one mile downstream of the study area included in the North Carolina 2012 Final 303(d) list due to sedimentation or turbidity.

**Comment:** “The environmental document should provide a detailed and itemized presentation of the proposed impacts to wetlands and streams with corresponding mapping. If mitigation is necessary as required by 15A NCAC 2H.0506(h), it is preferable to present a conceptual (if not finalized) mitigation plan with the environmental documentation. Appropriate mitigation plans will be required prior to issuance of a 401 Water Quality Certification.”

**Response:** Section 4.5.3.2.3 of this FEIS provides a detailed discussion of the anticipated impacts to wetlands as a result of the proposed project. The anticipated impacts by individual wetland are presented for the revised preliminary designs for the DEIS detailed study alternatives and NCDOT’s preferred alternative in Table 4-18. Section 4.5.3.2.1 of this FEIS provides a detailed discussion of the anticipated impacts to streams as a result of the proposed project. The anticipated impacts by individual stream are presented for the revised preliminary designs for the DEIS detailed study alternatives and NCDOT’s preferred alternative in Table 4-14. Figures 10A through 10K and Figures 16A through 16G graphically depict the locations of wetland and stream impacts for the DEIS detailed study alternatives and the preferred alternative, respectively. As discussed in Section 4.5.4.1.2 of this FEIS, NCDOT is investigating potential on-site stream and wetland mitigation opportunities for the preferred alternative. On-site mitigation will be used as much as possible. Off-site mitigation needed to satisfy the federal Clean Water Act requirements for this project will be provided by the NCDENR Ecosystem Enhancement Program. During the Section 401 Water Quality Certification and Section 404 Permit application process, NCDOT will work with NCDWR and USACE to determine appropriate mitigation.

**Comment:** “Environmental impact statement alternatives shall consider design criteria that reduce the impacts to streams and wetlands from storm water runoff. These alternatives shall include road designs that allow for treatment of the storm water runoff through best management practices as detailed in the most recent version of the NCDWR’s *Stormwater Best Management Practices Manual*, July 2007, such as grassed swales, buffer areas, preformed scour holes, retention basins, etc.”

**Response:** The Section 401 Water Quality Certification application will specify stormwater management methods. NCDOT will develop a stormwater management plan and use appropriate Stormwater Best Management Practices to control and/or treat stormwater runoff. Design criteria for NCDOT's preferred alternative preliminary design are discussed in Section 2.4.2 of this FEIS. NCDOT will continue to work with the merger team through Concurrence Points 4B (review of conceptual drainage design with 30 percent hydraulic design) and 4C (review surface drainage design and permit drawings with 100 percent hydraulic design).

**Comment:** "After the selection of the preferred alternative and prior to an issuance of the 401 Water Quality Certification, the NCDOT is respectfully reminded that they will need to demonstrate the avoidance and minimization of impacts to wetlands (and streams) to the maximum extent practical. In accordance with the Environmental Management Commission's Rules (15A NCAC 2H.0506[h]), mitigation will be required for impacts of greater than 1 acre to wetlands. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The NC Ecosystem Enhancement Program may be available for use as wetland mitigation.

In accordance with the Environmental Management Commission's Rules (15A NCAC 2H.0506[h]), mitigation will be required for impacts of greater than 150 linear feet to any single stream. In the event that mitigation is required, the mitigation plan shall be designed to replace appropriate lost functions and values. The NC Ecosystem Enhancement Program may be available for use as stream mitigation."

**Response:** NCDOT has coordinated with NCDWR and USACE to avoid and minimize impacts to wetlands and streams through Concurrence Points 2A (bridging decisions and alignment review) and 4A (avoidance and minimization). Section 4.5.4.1.1 of the DEIS discussed the avoidance and minimization measures for impacts to Waters of the United States incorporated into the preliminary designs of the DEIS detailed study alternatives, and Section 4.5.4.1.1 of this FEIS discusses the additional avoidance and minimization measures incorporated into the preliminary design of NCDOT's preferred alternative since the release of the DEIS. The NEPA/Section 404 merger team concurred on avoidance and minimization measures for Military Cutoff Road Extension in September 2012 and for US 17 Hampstead Bypass in June 2013. Copies of the signed Avoidance and Minimization concurrence forms are included in Appendix C of this FEIS. The merger team concurred on avoidance and minimization measures for the two proposed service roads for Military Cutoff Road Extension in April 2014. A copy of the revised April 2014 form is included in Appendix C. The merger team has not yet concurred on avoidance and minimization measures for the eight proposed service roads for the US 17 Hampstead Bypass. As documented in the "Project Commitments" section of this FEIS, NCDOT will continue to explore options to avoid and minimize impacts to jurisdictional resources with the proposed US 17 Hampstead Bypass service roads and will seek formal concurrence from the merger team after all options have been explored. The Project Commitments section also documents the other avoidance

and minimization measures incorporated into the preferred alternative. NCDOT will continue to work with these agencies through Concurrence Points 4B (review of conceptual drainage design with 30 percent hydraulic design) and 4C (review surface drainage design and permit drawings with 100 percent hydraulic design) and to obtain a Section 401 Water Quality Certification and a Section 404 Permit prior to project construction. During the Section 401 Water Quality Certification and Section 404 Permit application process, NCDOT will work with NCDWR and USACE to determine appropriate wetland impacts mitigation. As discussed in Section 4.5.4.1.2 of this FEIS, off-site wetland impacts mitigation needed to satisfy the federal Clean Water Act requirements for this project will be provided by the NCDENR Ecosystem Enhancement Program in accordance with the “North Carolina Department of Environment and Natural Resources’ Ecosystem Enhancement Program In-Lieu Fee Instrument”, dated July 28, 2010.

**Comment:** “The NCDWR is very concerned with sediment and erosion impacts that could result from this project. The NCDOT shall address these concerns by describing the potential impacts that may occur to the aquatic environments and any mitigating factors that would reduce the impacts.”

**Response:** Sections 4.5.3, 4.6.2, and 4.7.1.7 of the DEIS, as well as Sections 4.5.3 and 4.7.1.7 of this FEIS, describe potential impacts related to sedimentation. Construction activities associated with the project will strictly follow NCDOT’s Best Management Practices for Construction and Maintenance Activities (BMP-CMA) and Protection of Surface Waters (BMP-PSW). Sedimentation control guidelines will be strictly enforced during the construction stages of the project.

**Comment:** “An analysis of cumulative and secondary impacts anticipated as a result of this project is required. The type and detail of analysis shall conform to the NC Division of Water Resources Policy on the assessment of secondary and cumulative impacts dated April 10, 2004.”

**Response:** A Community Impact Assessment and Qualitative Indirect and Cumulative Effects Assessment was prepared for the proposed project in June 2009. The results of the indirect and cumulative effects assessment were presented in Section 4.6 of the DEIS. An updated Indirect and Cumulative Effects Analysis, including an Indirect and Cumulative Effects (ICE) Screening Report and Land Use Scenario Assessment (LUSA) (September 2013), was completed for the proposed project. A summary of the ICE/LUSA findings are included in Section 4.6 of this FEIS.

**Comment:** “Based on the information presented in the document, the magnitude of impacts to wetlands and streams may require an Individual Permit application to the Corps of Engineers and corresponding 401 Water Quality Certification. Please be advised that a 401 Water Quality Certification requires satisfactory protection of water quality to ensure that water quality standards are met and no wetland or stream uses are lost. Final permit authorization will require the submittal of a formal application by the

NCDOT and written concurrence from the NCDWR. Please be aware that any approval will be contingent on appropriate avoidance and minimization of wetland and stream impacts to the maximum extent practical, the development of an acceptable stormwater management plan, and the inclusion of appropriate mitigation plans where appropriate.”

**Response:** NCDOT has coordinated with NCDWR and USACE to avoid and minimize impacts to wetlands and streams through Concurrence Points 2A (bridging decisions and alignment review) and 4A (avoidance and minimization). NCDOT will continue to work with these agencies for Concurrence Points 4B (review of conceptual drainage design with 30 percent hydraulic design) and 4C (review surface drainage design and permit drawings with 100 percent hydraulic design) and to obtain a Section 401 Water Quality Certification and a Section 404 Permit prior to project construction. The Section 401 Water Quality Certification will specify stormwater management methods. During the Section 401 Water Quality Certification and Section 404 Permit application process, NCDOT will work with NCDWR and USACE to determine appropriate stream and wetland impacts mitigation.

***North Carolina Wildlife Resources Commission – December 4, 2013***

**Comment:** “The projects are being planned under the NEPA/Section 404 Merger 01 Process. WRC is represented in this process and comments provided in conjunction with this process have been documented. WRC also provided comments, dated October 19, 2011, on the DEIS, comments provided in that memorandum are still applicable. At this time we do not have additional specific concerns related to the information provided in the supplemental DEIS.”

**Response:** NCWRC’s comment that it currently does not have additional specific concerns related to the information provided in the SDEIS is acknowledged.

## 6.0 LIST OF PREPARERS

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This chapter includes a list of the principal participants in the preparation of this Final Environmental Impact Statement.

### 6.1 NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

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Name	Qualifications	Primary Responsibilities
James McInnis, Jr. PE Project Engineer	BS in Civil Engineering with 22 years of experience in project planning and development	Project development and document review
Kim Gillespie, PE Project Planning Engineer	BCE in Civil Engineering with 25 years of experience in traffic engineering, and project planning and development	Project management and document review
Robert Hanson, PE Eastern Project Development Section Head	MCE in Civil Engineering and BS in Civil Engineering with 27 years of experience in transportation engineering	Management oversight and document review
Gary Lovering, PE Project Engineer	BS in Civil Engineering with 34 years of experience in roadway design	Preliminary Design review
Kevin Moore, PE Project Design Engineer	BS in Civil Engineering with 20 years of experience in roadway design	Preliminary Design review
Benjetta Johnson, PE Congestion Management Regional Engineer	BS in Civil Engineering with 13 years of experience in traffic engineering	Traffic Analysis Report review
Stephen Yeung, PE Congestion Management Project Design Engineer	BS in Electrical Engineering with 9 years of experience in traffic engineering	Traffic Analysis Report review
Herman Huang, Ph.D. Community Planner	Ph.D. in City and Regional Planning, MS in Environmental Science, and BS in Chemistry with 4 years of experience in community planning	Indirect and Cumulative Effects and Land Use Scenario Assessment Update Review

## 6.2 MULKEY ENGINEERS AND CONSULTANTS

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Name	Qualifications	Primary Responsibilities
Liz Kivaschitz, AICP Principal, Planning Program Manager	MS in Environmental Studies and BA in Geography with 23 years of experience in environmental and transportation planning and project development	Overall project management and development of the FEIS
J.A. Bissett, PE Principal	BS in Civil Engineering with 29 years of experience in transportation planning and project development	Quality Assurance
Steven Drum, PE Roadway Design Engineer	BS in Civil Engineering with 25 years of experience in roadway design and transportation planning	Preliminary Design Quality Assurance
Johnny Banks Roadway Designer	Associates in Architectural Technology with 27 years of experience in roadway design	Preliminary Design
Jeff Tokarczyk, GISP GIS Analyst	BA in Geography with 13 years of experience in planning and GIS	Impacts analysis and environmental document figures
Bobby Norburn, EI Senior Planner	BS in Civil Engineering with 20 years of experience in environmental and transportation planning and project development	Environmental document preparation
Kat Bukowy Planner	Master of Public Administration, Master of Natural Resources and BS in Environmental Science with 6 years of experience in environmental and transportation planning and GIS	Environmental document preparation
Mark Mickley Environmental Scientist	BS in Biology with 9 years of experience in natural resource investigations	Natural resource investigations Principal Investigator

### **6.3 RS&H ARCHITECTS-ENGINEERS-PLANNERS, INC.**

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<b>Name</b>	<b>Qualifications</b>	<b>Primary Responsibilities</b>
Radha Krishna Swayampakala, PE Transportation Engineer	MS in Civil Engineering with 11 years of experience in traffic operations and transportation planning	Traffic operations analysis
Edith G. Peters, P.E. Transportation Engineer	BS in Civil Engineering with 7 years of experience in traffic operations and transportation planning	Traffic operations analysis





# **APPENDIX A**

## **FIGURES**

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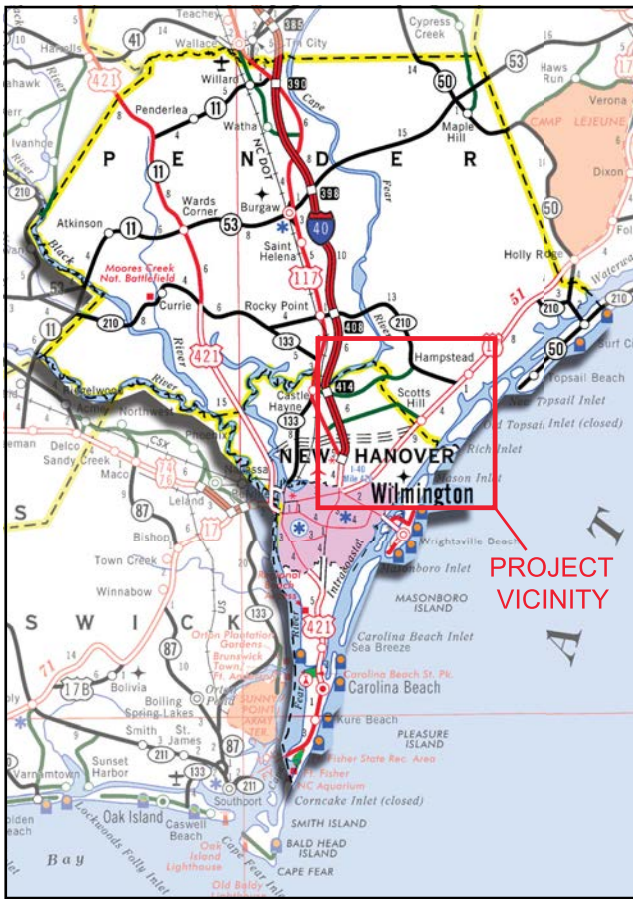


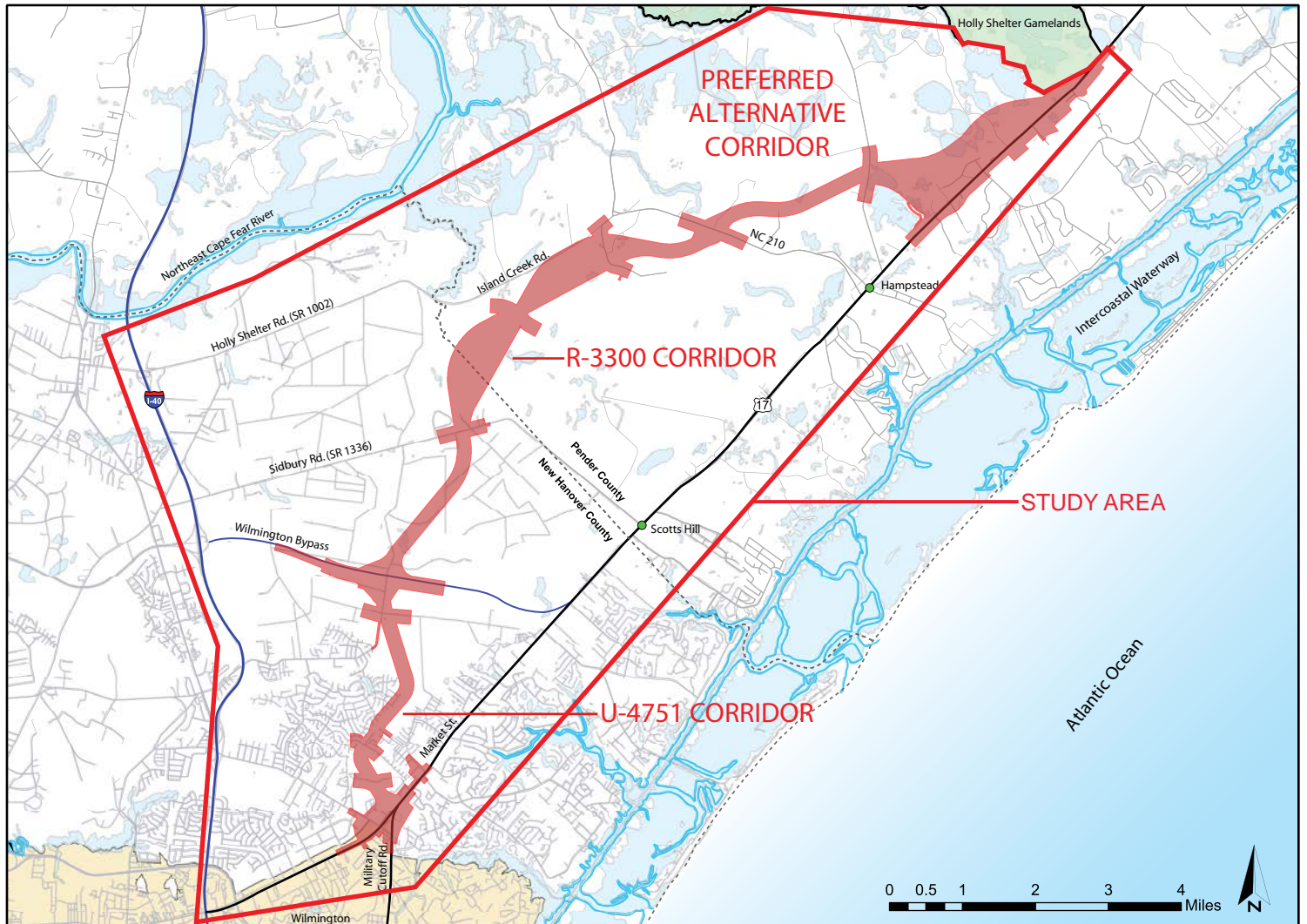
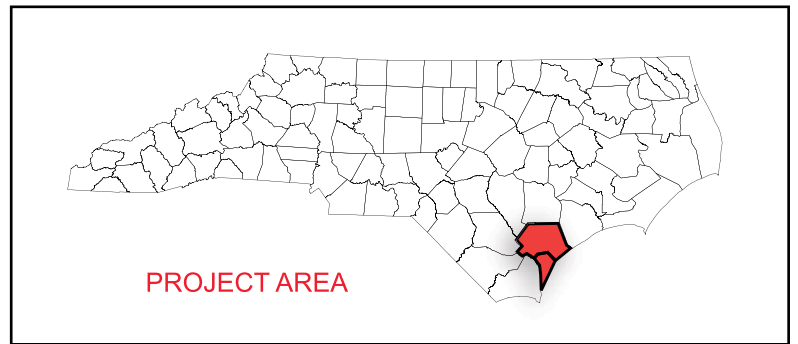
Figure 1

## PROJECT VICINITY

US 17 Corridor Study  
NCDOT TIP Nos. U-4751 and R-3300  
New Hanover and Pender Counties



North Carolina  
Department of Transportation









# L E G E N D

### No. of Vehicles Per Day (VPD) in I00s

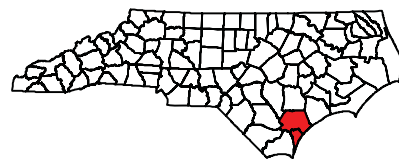
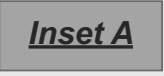
$DHV \xrightarrow[PM]{(d, t)} D$

DHV	Design Hourly Volume (%) = K30
PM	PM Peak Period
D	Peak Hour Directional Split (%)
$\longrightarrow$	Indicates Direction of D
$(d, t)$	Duals, TT-STs (%)

$$\text{DHV} \xrightarrow[\text{(d, t)}]{\text{PM}} \text{D}$$

PM PM Peak Period

→ Indicates Direction of D

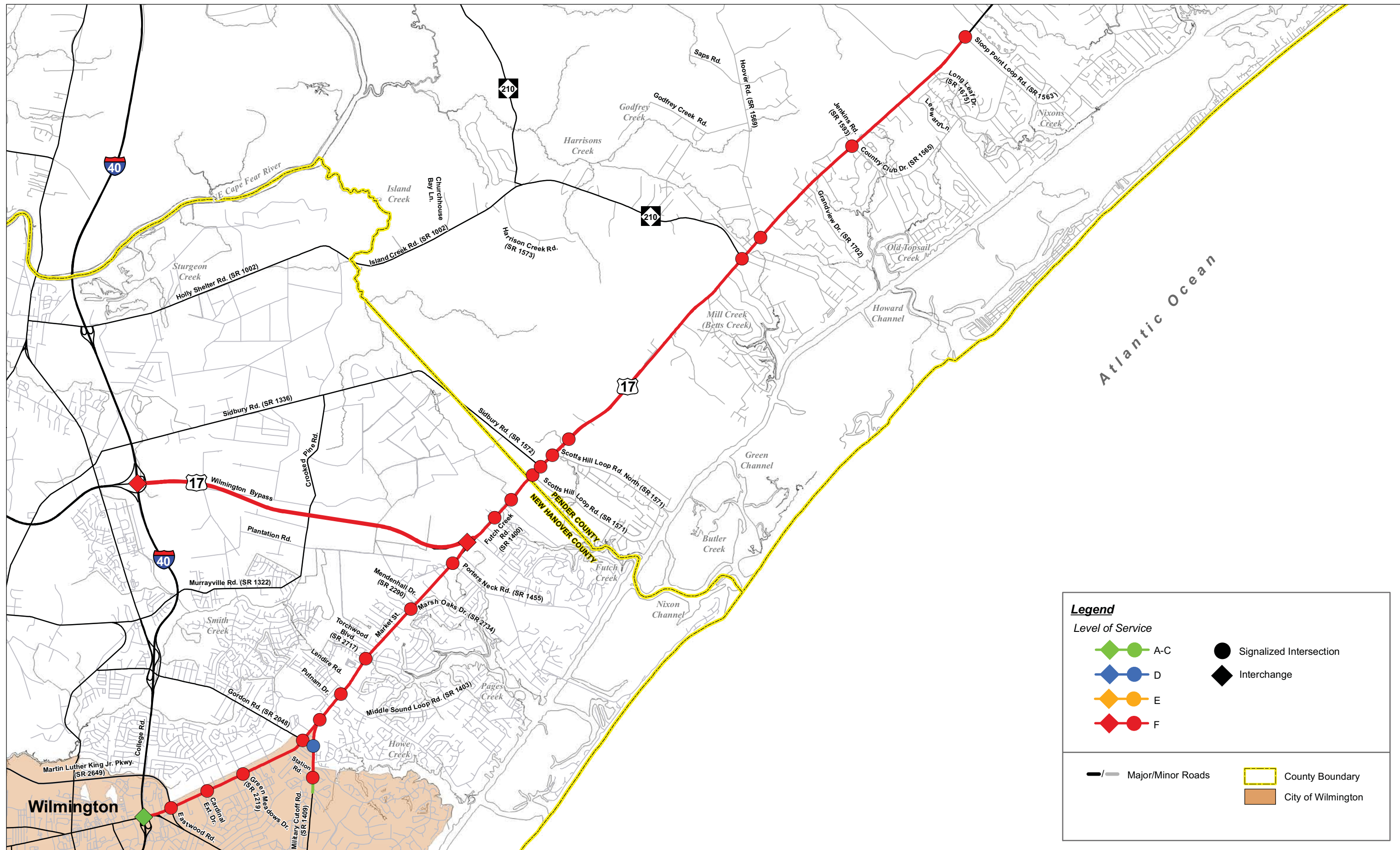


**2035 Average Annual Daily Traffic**  
***No Build***

Figure Prepared 1/17/2011

4





Prepared by: **MULKEY**  
ENGINEERS & CONSULTANTS

Prepared for:



**2035 Level of Service  
No-Build**

US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

0 3,500 7,000 14,000  
Feet

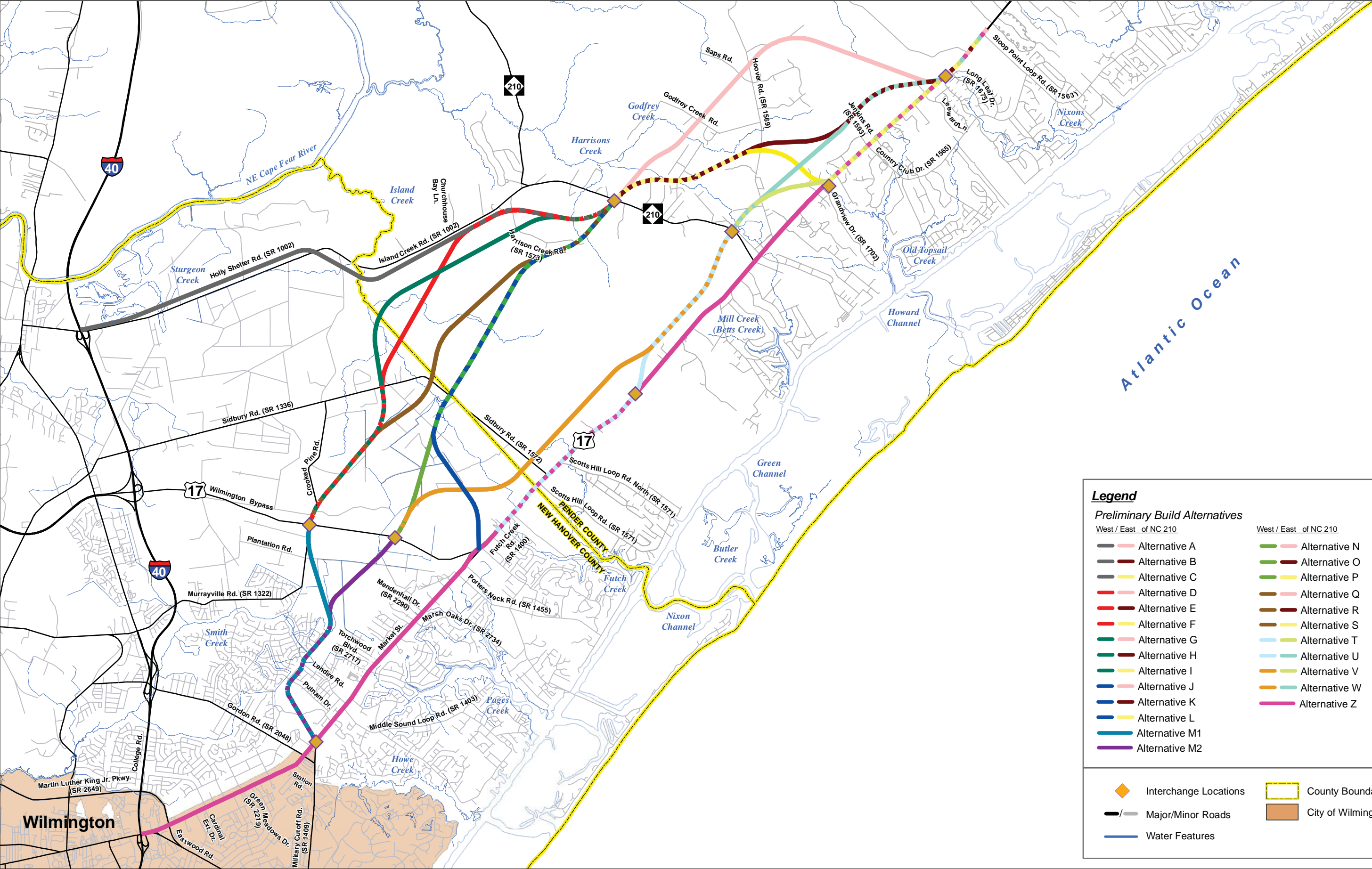
Data Sources: NCDOT and Mulkey GIS  
U-4751/R-3300 Traffic Operations Analysis Report  
Figure Prepared: 10/21/10



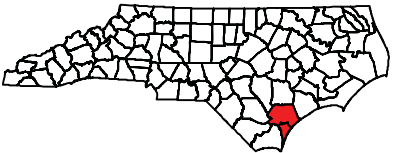
Figure No.

5





Prepared by:   
Prepared for: 



**Preliminary Build Alternatives**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

0 3,500 7,000 14,000 Feet  
Data Sources: NCDOT and Mulkey GIS  
Figure Prepared: 10/21/10



**Figure No.**  
**6**



NEW HANOVER COUNTY NORTH CAROLINA

I, ARNOLD W. CARSON, CERTIFY THAT THIS PLAT WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS SURVEY MADE UNDER MY SUPERVISION (DESCRIPTIONS RECORDED AS SHOWN HEREON); THAT THE INDIVIDUAL BOUNDARIES WERE NOT SURVEYED AND ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND AS SHOWN HEREON; THAT THIS GPS SURVEY WAS PERFORMED EXCEEDING ORDER (C) 3 OF THE FGCC SPECIFICATIONS AND THAT I USED RTK (STATIC MODE) GPS FIELD PROCEDURES AND COORDINATES WERE OBTAINED BY AVERAGE MEAN METHOD OF 3 OR MORE OBSERVATIONS WITH DEVIATIONS LESS THAN 0.1' OF EACH POINT SHOWN HEREON; THAT THIS SURVEY WAS PERFORMED IN APRIL - JULY, 2005 USING (2) TOPCON HYPER L1/L2 RECIEVERS AND ALL COORDINATES ARE BASED ON NAD '83.

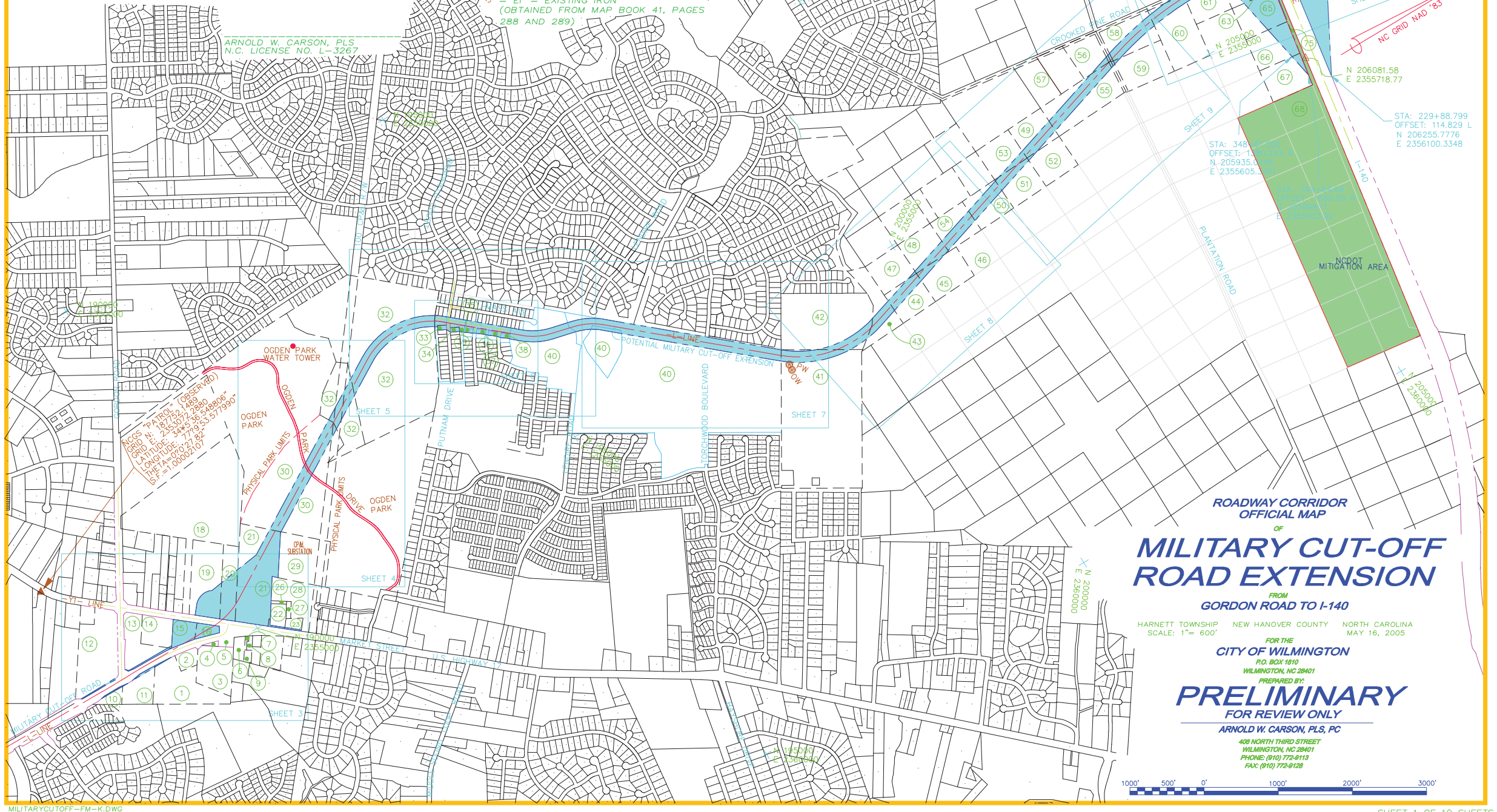
THAT THIS PLAT WAS PREPARED IN ACCORDANCE WITH G.S. 47-30 AS AMENDED. WITNESS MY ORIGINAL SIGNATURE, LISCENCE NUMBER AND SEAL THIS DAY OF \_\_\_\_\_ A.D., 2005.

THIS PLAT IS OF A POTENTIAL ROAD CORRIDOR AND IS AN EXCEPTION TO THE DEFINITION OF A SUBDIVISION. ACCORDING TO G.S. 47-30 (f)(1)(d), AND IS PREPARED IN ACCORDANCE WITH G.S. 153A -335(3)

ARNOLD W. CARSON, PLS  
N.C. LICENSE NO. L-3267

## LEGEND

- ▲ = NCGS GRID MONUMENT (PRIMARY CONTROL POINT)
- △ = NCDOT RIGHT OF WAY DISC (CONTROL POINT)
- = EXISTING CONCRETE MONUMENT (CONTROL POINT)
- = EI = EXISTING IRON
- = OIP = OLD IRON PIPE
- = EIR = EXISTING IRON ROD
- = EIP = EXISTING IRON PIPE
- ☆ = EXISTING PK NAIL
- ⊙ = PW = PRODUCTION WELL
- ⊙ = OW = OBSERVATION WELL
- = EXISTING SANITARY SEWER MANHOLE
- = SMAG = SET MAG NAIL
- = SPK = SET "PK" NAIL
- = EI = EXISTING IRON (OBTAINED FROM MAP BOOK 41, PAGES 288 AND 289)



Prepared by: **MULKEY**  
ENGINEERS, ARCHITECTS & PLANNERS

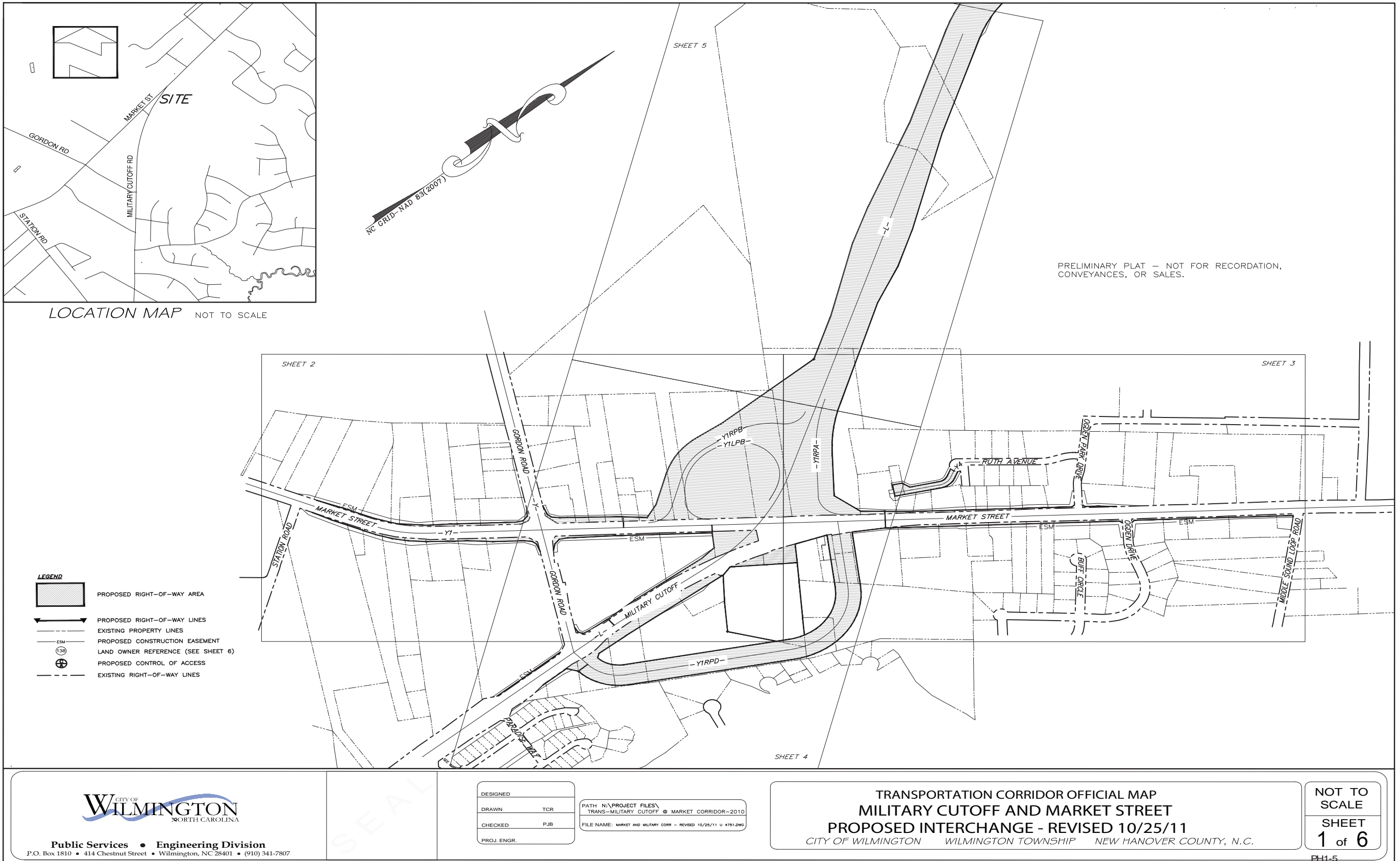
Prepared for:



**City of Wilmington Military Cut-Off Road Extension**  
**Transportation Corridor Official Map**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

Data Source: City of Wilmington  
Figure Prepared: 10/21/10

Figure No.  
**7A**



Prepared by:   
Prepared for: 



**City of Wilmington Military Cut-Off Road Extension**  
**Transportation Corridor Official Map**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

Data Source: City of Wilmington  
Figure Prepared: 04/01/2014

**Figure No.**  
**7B**



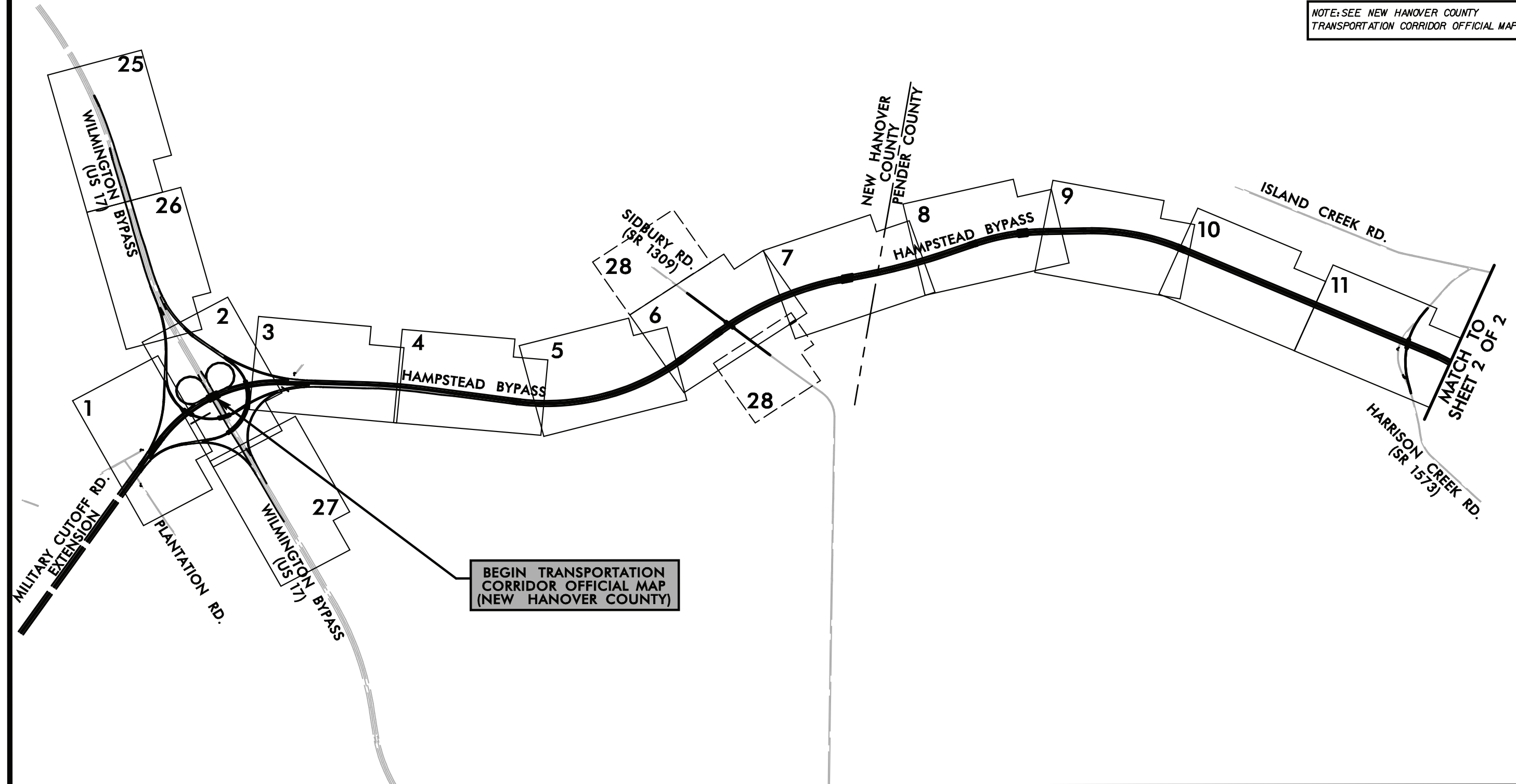
# MAP KEY

**MULKEY**  
ENGINEERS & CONSULTANTS  
PO BOX 33127  
RALEIGH, N.C. 27636  
(919) 851-1912  
(919) 851-1918 (FAX)  
WWW.MULKEYINC.COM

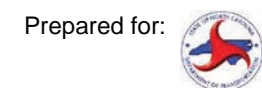
**PRELIMINARY PLANS**  
DO NOT USE FOR CONSTRUCTION

TRANSPORTATION CORRIDOR OFFICIAL MAP	
STATE PROJECT NO.	R-3300
US 17 BYPASS OF HAMPSTEAD	
NEW HANOVER & PENDER COUNTIES	
OFFICIAL SIGNATURE:	
DATE OF ADOPTION:	MAP KEY
	MAP 1 OF 2

NOTE: SEE NEW HANOVER COUNTY  
TRANSPORTATION CORRIDOR OFFICIAL MAP



Prepared by: **MULKEY**  
ENGINEERS & CONSULTANTS



**US 17 Hampstead Bypass**  
**Transportation Corridor Official Map**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

Data Source: Wilmington Urban Area Metropolitan Planning Organization  
Figure Prepared: 04/07/2014

**Figure No.**  
**7C**

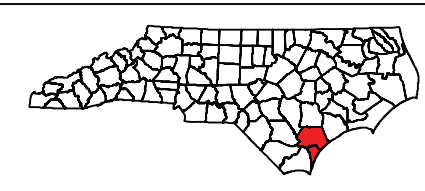
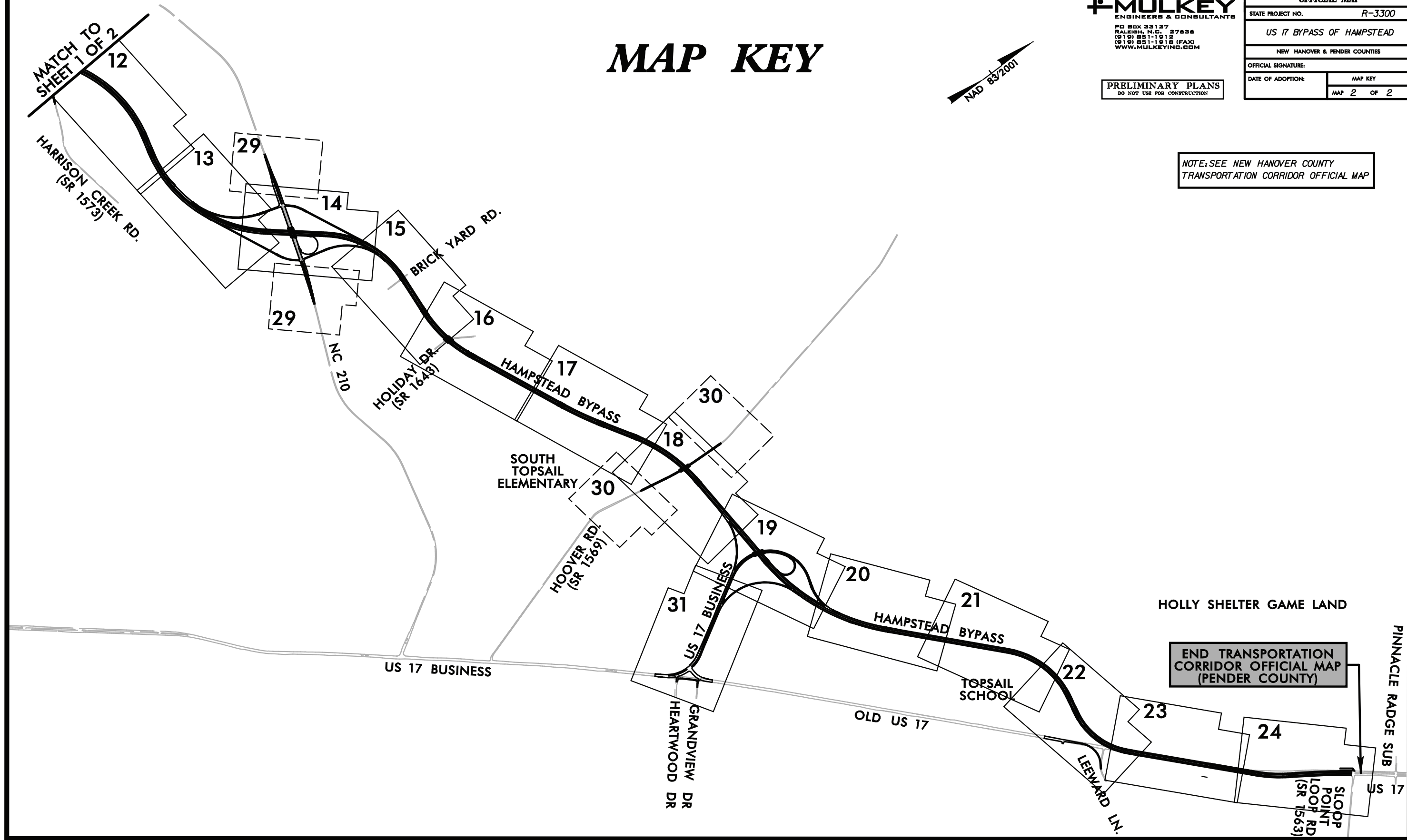
PRELIMINARY PLANS  
DO NOT USE FOR CONSTRUCTION

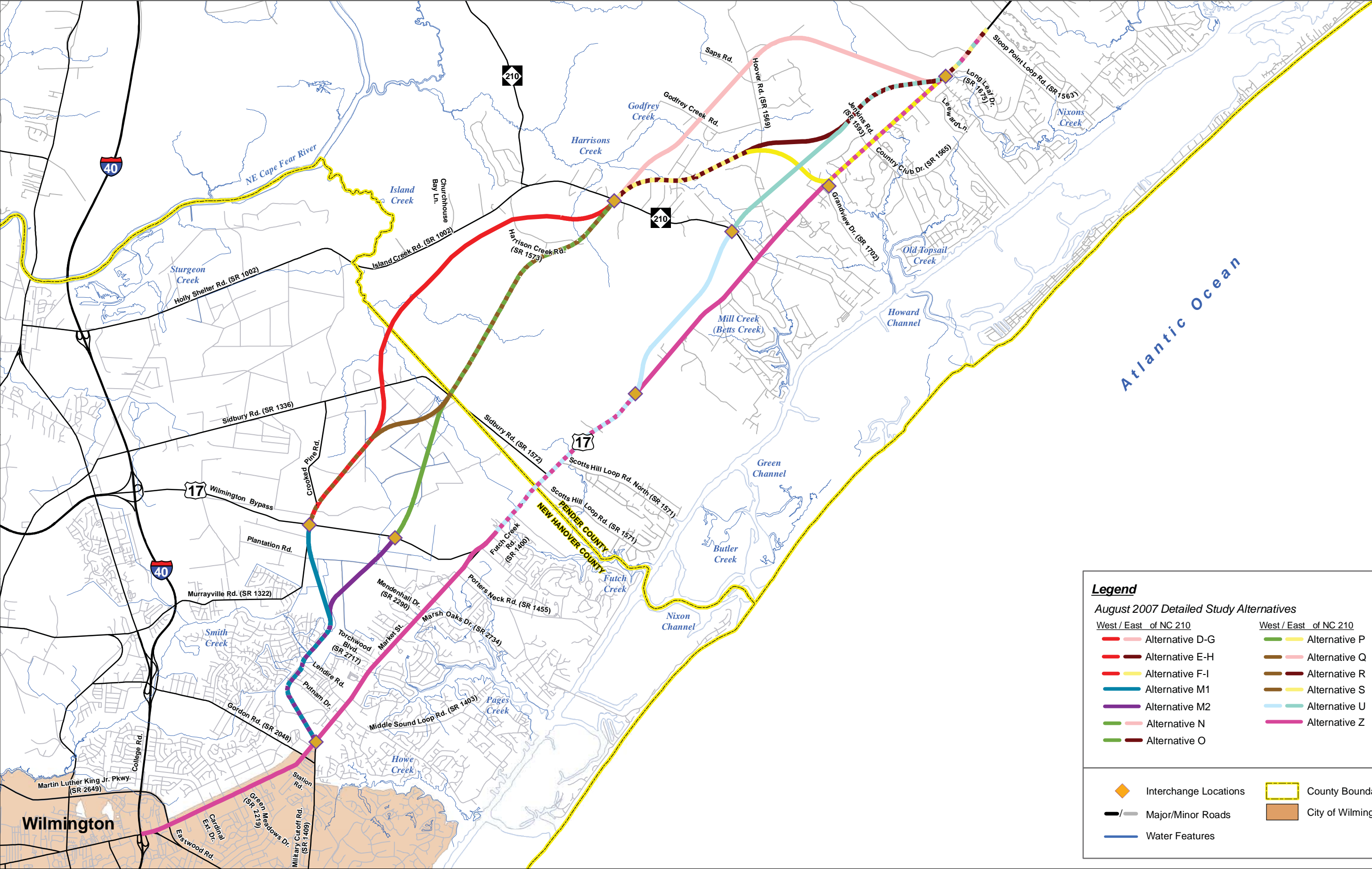
TRANSPORTATION CORRIDOR OFFICIAL MAP	
STATE PROJECT NO.	R-3300
US 17 BYPASS OF HAMPSTEAD	
NEW HANOVER & PENDER COUNTIES	
OFFICIAL SIGNATURE:	
DATE OF ADOPTION:	MAP KEY
	MAP 2 OF 2

# MAP KEY



NOTE: SEE NEW HANOVER COUNTY  
TRANSPORTATION CORRIDOR OFFICIAL MAP



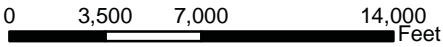


Prepared by: 



# August 2007 Detailed Study Alternatives

US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC



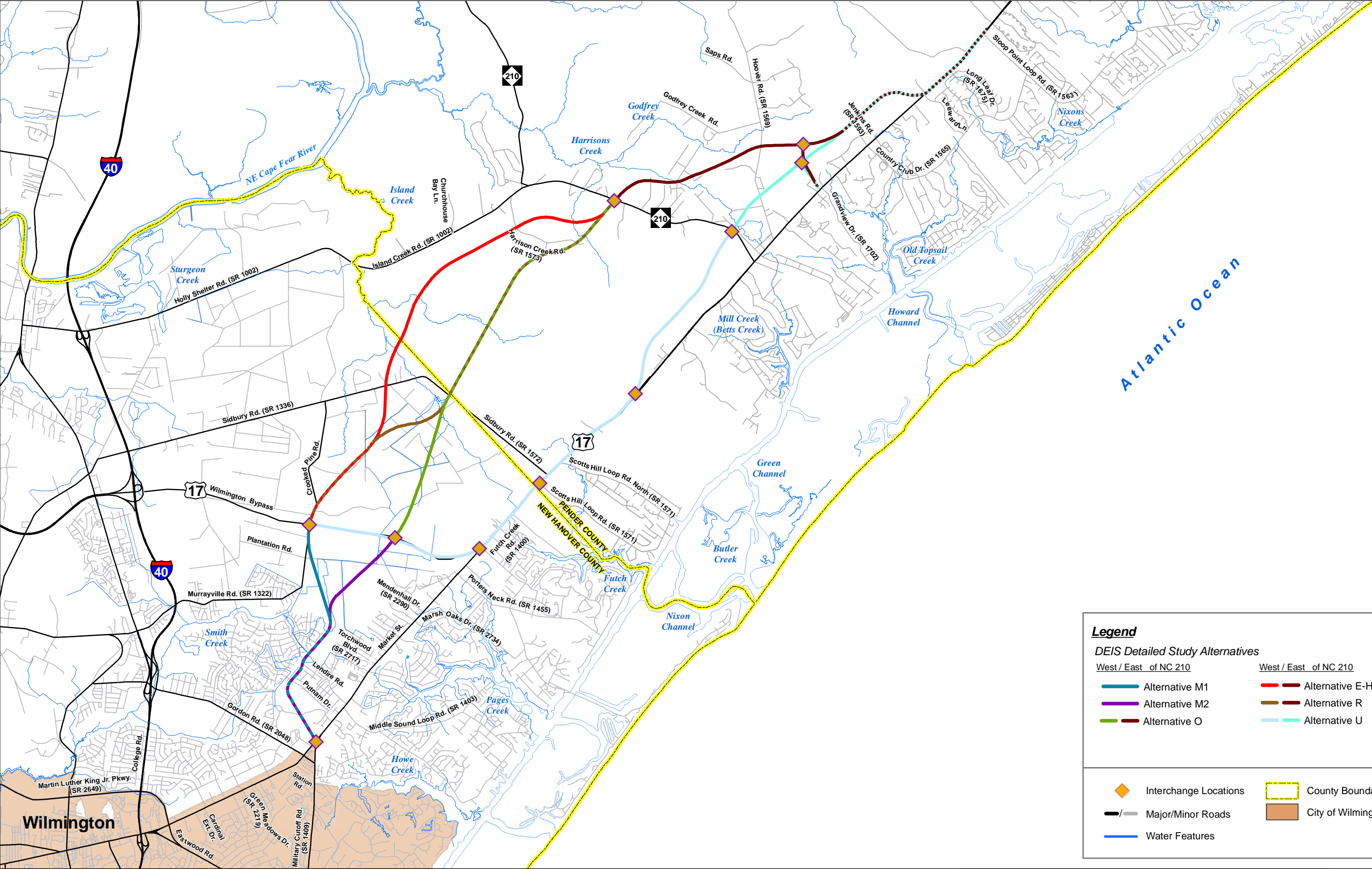
Data Sources: NCDOT and Mulkey GIS  
Figure Prepared: 10/21/10



Figure No.

8





**Legend**

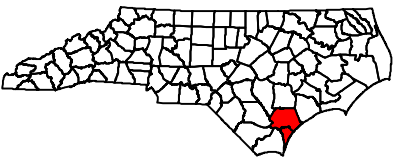
*DEIS Detailed Study Alternatives*

West / East of NC 210	West / East of NC 210
Alternative M1	Alternative E-H
Alternative M2	Alternative R
Alternative O	Alternative U

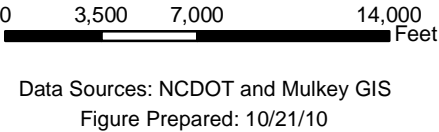
Interchange Locations	County Boundary
Major/Minor Roads	City of Wilmington
Water Features	

Prepared by:

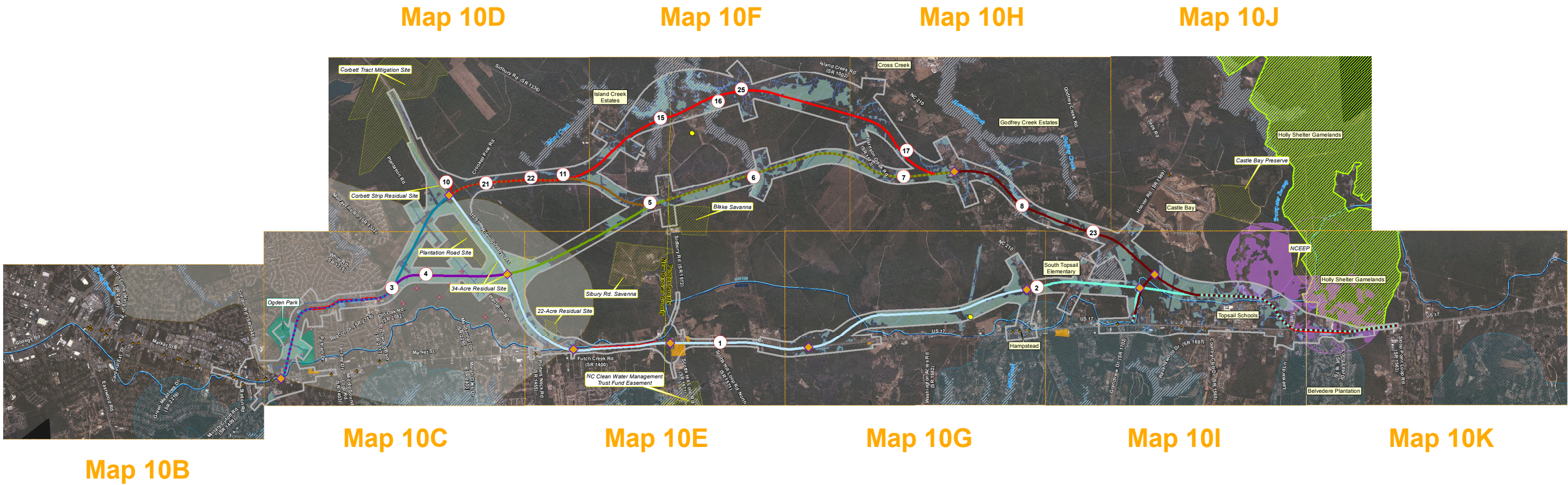
Prepared for:



**DEIS Detailed Study Alternatives**  
US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC







**Legend**

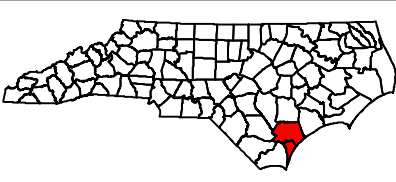
County Boundary	Significant Natural Heritage Area & Managed Area	River Basin
Map Grids	Floodplains	Potential Noise Barriers
Project Study Corridors	Historic Site	Interchange Locations
Wetland	Well Head Protection Area	RCW Habitat (Includes Potentially Suitable and Suitable Habitat)
Pond	CFPUA Well	RCW Partitions
Stream	Hazmat/UST	
HQW / ORW	Permitted Mine/Quarry	
Holly Shelter Gamelands	Hydraulic Site	

**Alternatives**

<u>West / East of NC 210</u>	<u>West / East of NC 210</u>
Alternative M1	Alternative E-H
Alternative M2	Alternative R
Alternative O	Alternative U

Prepared by: **MULKEY**  
ENGINEERS & CONSULTANTS

Prepared for:



# DEIS Detailed Study Alternatives - Environmental Features

US 17 Corridor Study  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

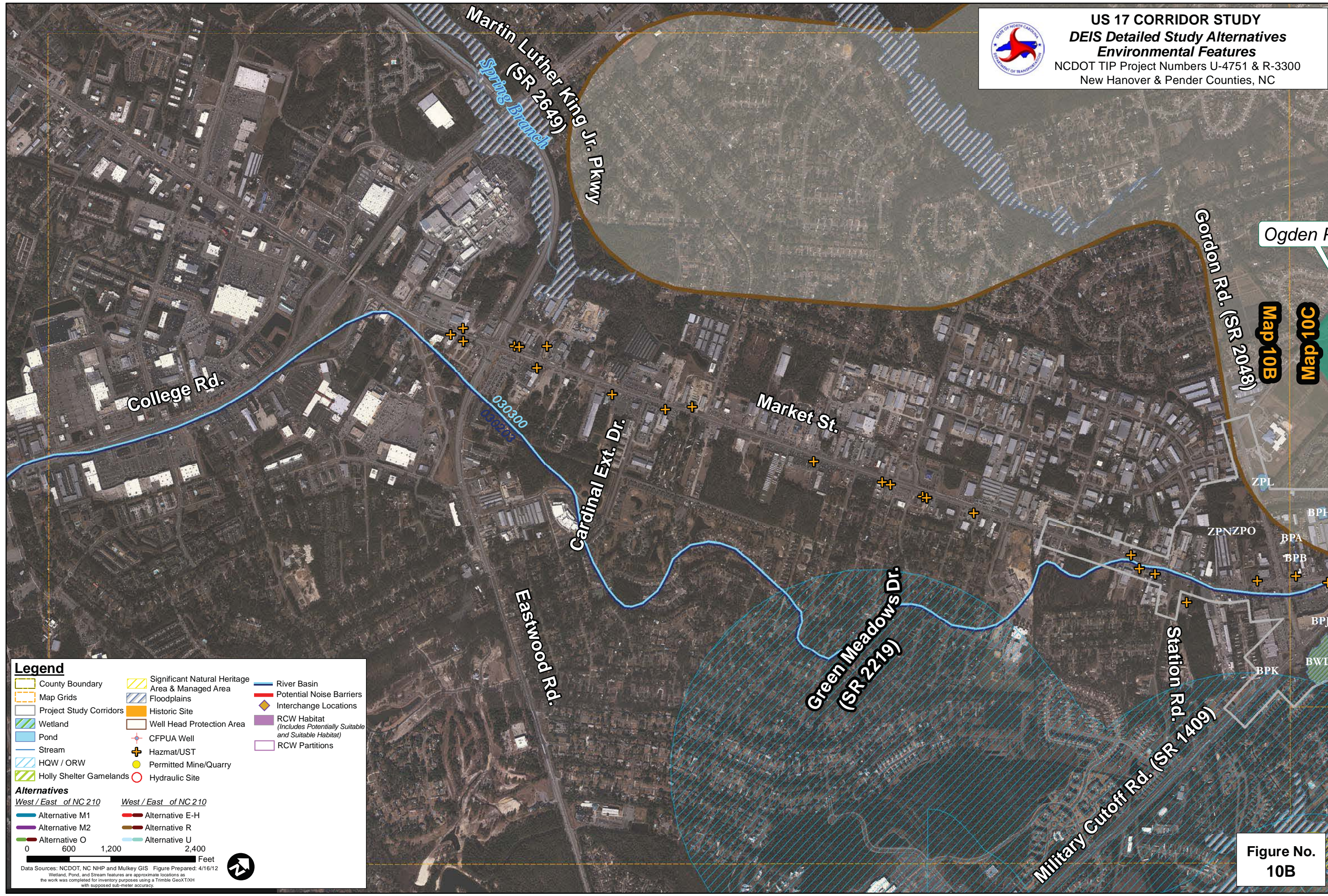
0 3,500 7,000 14,000 Feet

Data Sources: NCDOT, NC NHP and Mulkey GIS Figure Prepared: 4/16/12

Wetland, Pond, and Stream features are approximate locations as the work was completed for inventory purposes using a Trimble GeoXT17XH with supposed sub-meter accuracy.

Figure No.  
**10A**





Ogden P

**Map 10B**  
**Map 10C**

**Legend**

County Boundary	Significant Natural Heritage Area & Managed Area	River Basin
Map Grids	Floodplains	Potential Noise Barriers
Project Study Corridors	Historic Site	Interchange Locations
Wetland	Well Head Protection Area	RCW Habitat (Includes Potentially Suitable and Suitable Habitat)
Pond	CFPWA Well	RCW Partitions
Stream	Hazmat/UST	
HQW / ORW	Permitted Mine/Quarry	
Holly Shelter Gamelands	Hydraulic Site	

**Alternatives**

Alternative M1	Alternative E-H
Alternative M2	Alternative R
Alternative O	Alternative U

0 600 1,200 2,400 Feet

Data Sources: NCDOT, NC NHP and Mulkey GIS Figure Prepared: 4/16/12  
Wetland, Pond, and Stream features are approximate locations as the work was completed for inventory purposes using a Trimble GeoXTXH with supposed sub-meter accuracy.

**Figure No.**  
**10B**





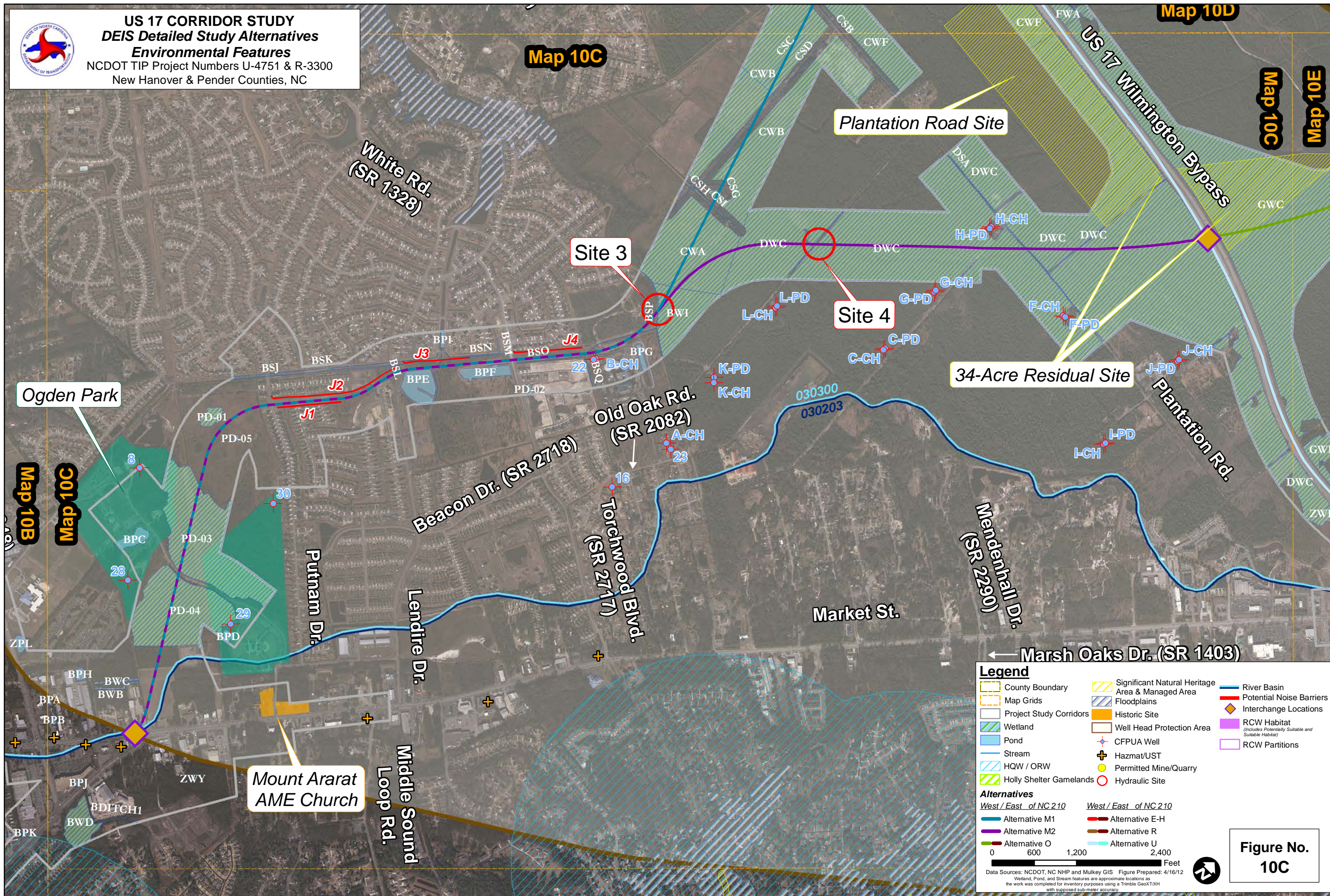
**US 17 CORRIDOR STUDY**  
**DEIS Detailed Study Alternatives**  
**Environmental Features**  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC

**Map 10C**

**Map 10D**

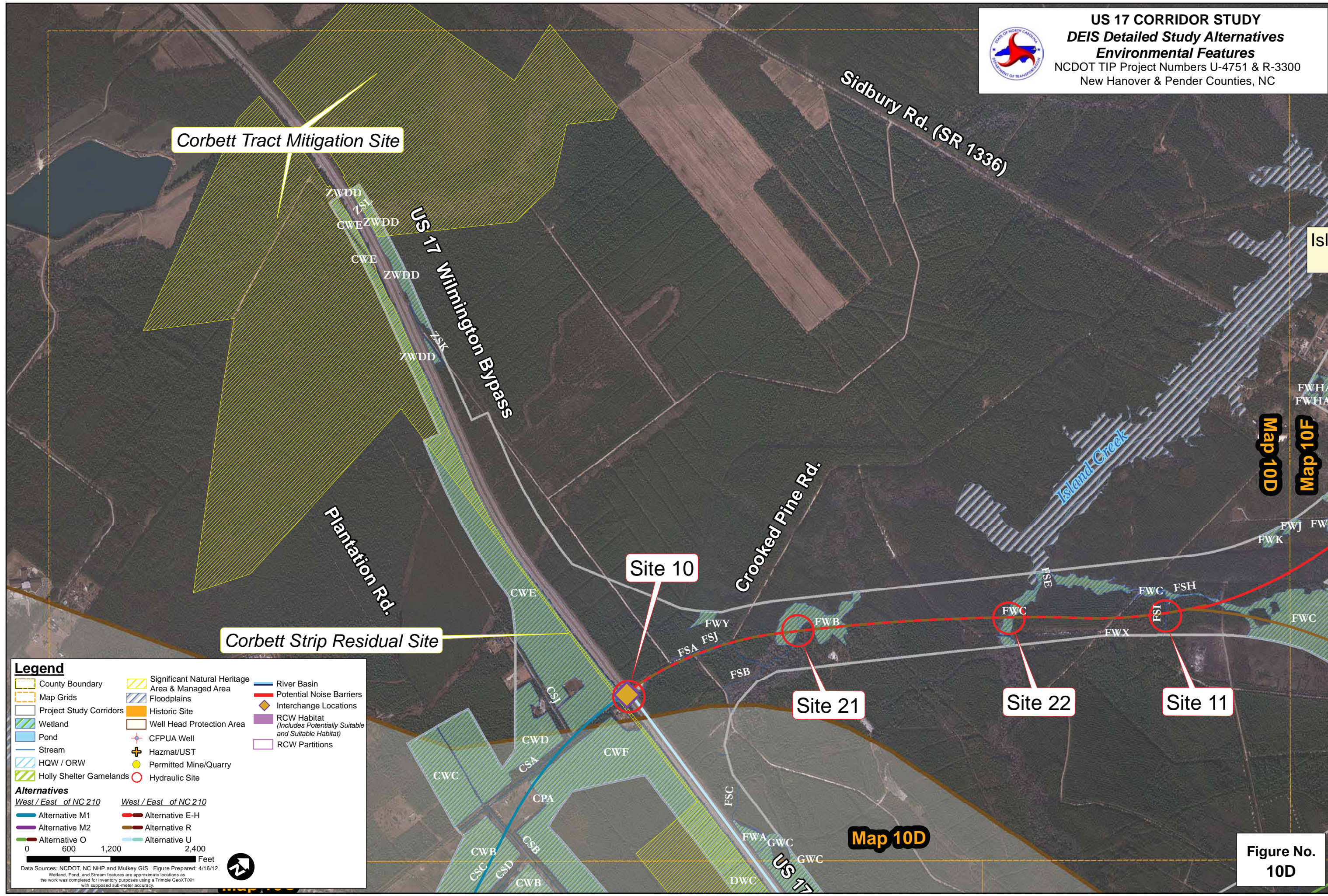
**Map 10C**

**Map 10E**



**Figure No.**  
**10C**





**Legend**

County Boundary	Significant Natural Heritage Area & Managed Area	River Basin
Map Grids	Floodplains	Potential Noise Barriers
Project Study Corridors	Historic Site	Interchange Locations
Wetland	Well Head Protection Area	RCW Habitat (Includes Potentially Suitable and Suitable Habitat)
Pond	CFPUA Well	RCW Partitions
Stream	Hazmat/UST	
HQW / ORW	Permitted Mine/Quarry	
Holly Shelter Gamelands	Hydraulic Site	

**Alternatives**

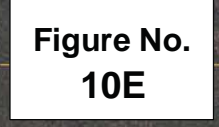
Alternative M1	Alternative E-H
Alternative M2	Alternative R
Alternative O	Alternative U

0 600 1,200 2,400 Feet

Data Sources: NCDOT, NC NHP and Mulkey GIS Figure Prepared: 4/16/12  
Wetland, Pond, and Stream features are approximate locations as the work was completed for inventory purposes using a Trimble GeoXTXH with supposed sub-meter accuracy.

**Figure No. 10D**

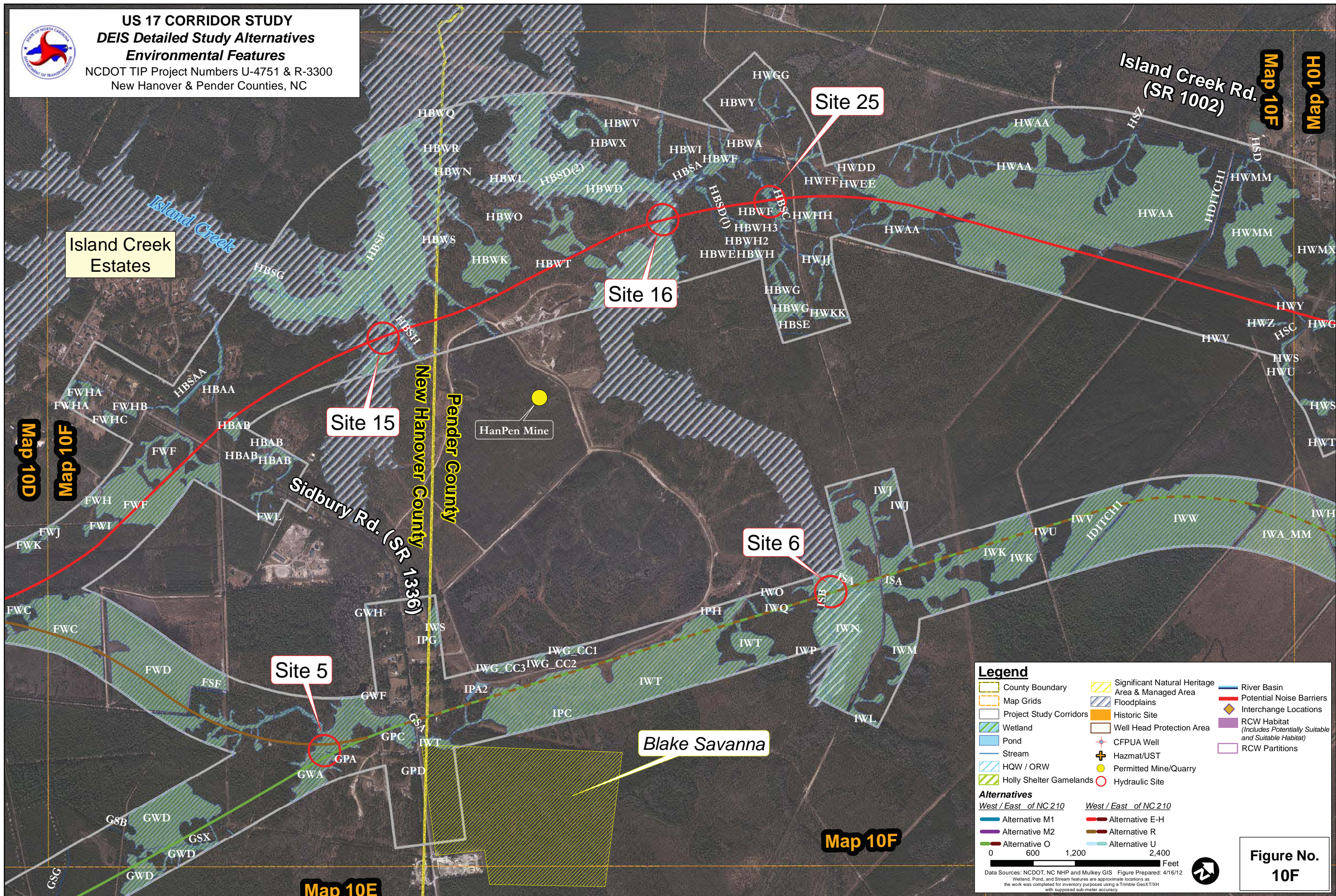








**US 17 CORRIDOR STUDY**  
**DEIS Detailed Study Alternatives**  
**Environmental Features**  
NCDOT TIP Project Numbers U-4751 & R-3300  
New Hanover & Pender Counties, NC



**Legend**

County Boundary	Significant Natural Heritage Area & Managed Area	River Basin
Map Grids	Floodplains	Potential Noise Barriers
Project Study Corridors	Historic Site	Interchange Locations
Wetland	Well Head Protection Area	RCW Habitat (Includes Potentially Suitable and Suitable Habitat)
Pond	CFPUA Well	RCW Partitions
Stream	Hazmat/UST	
HQW / ORW	Permitted Mine/Quarry	
Holly Shelter Gamelands	Hydraulic Site	

**Alternatives**

West / East of NC 210		West / East of NC 210	
Alternative M1	Alternative E-H	Alternative R	Alternative U
Alternative M2			
Alternative O			

0 600 1,200 2,400 Feet

Data Sources: NCDOT, NC NHP and Mulkey GIS. Figure Prepared: 4/16/12. Wetland, Pond, and Stream features are approximate locations as the work was completed for inventory purposes using a Trimble GeoXT/GXH with supposed sub-meter accuracy.

**Figure No. 10F**



